RIPARIAN COMMUNITY TYPE CLASSIFICATION OF NORTHERN UTAH AND ADJACENT IDAHO

By

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A preliminary draft reproduced for in-service distribution to facilitate field testing

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INTRODUCTION

Current Forest Service, U.S. Department of Agriculture policy calls for management of riparian ecosystems with full recognition of their importance and unique values, as well as the classification, inventory, and delineation of riparian ecosystems for land management planning (Peterson 1983). Specifically, riparian areas, of which riparian ecosystems are one component, are to be delineated and inventoried in the Forest land management planning process (FSM 2526.04). This classification of riparian ecosystems for northern Utah is intended to serve as a tool to aid in delineation and inventory. Classification of riparian ecosystems into different units of vegetation provides an integrated, ecosystem-management approach to resource categorization. Community types are units of vegetation having similar floristic composition and are the foundation of this classification.

The area covered by this classification (fig. 1), extends roughly from the northern tip of the Bear River Range near Soda Springs, Idaho, southward through the Wasatch Range to Soldier Summit, Utah. In addition, the Malad, Bannock and Portneuf Ranges, and the southern portion of the Aspen and Caribou Ranges, all in southern Idaho, are also included. Lands within the Caribou, Wasatch-Cache, and Uinta National Forests are featured.

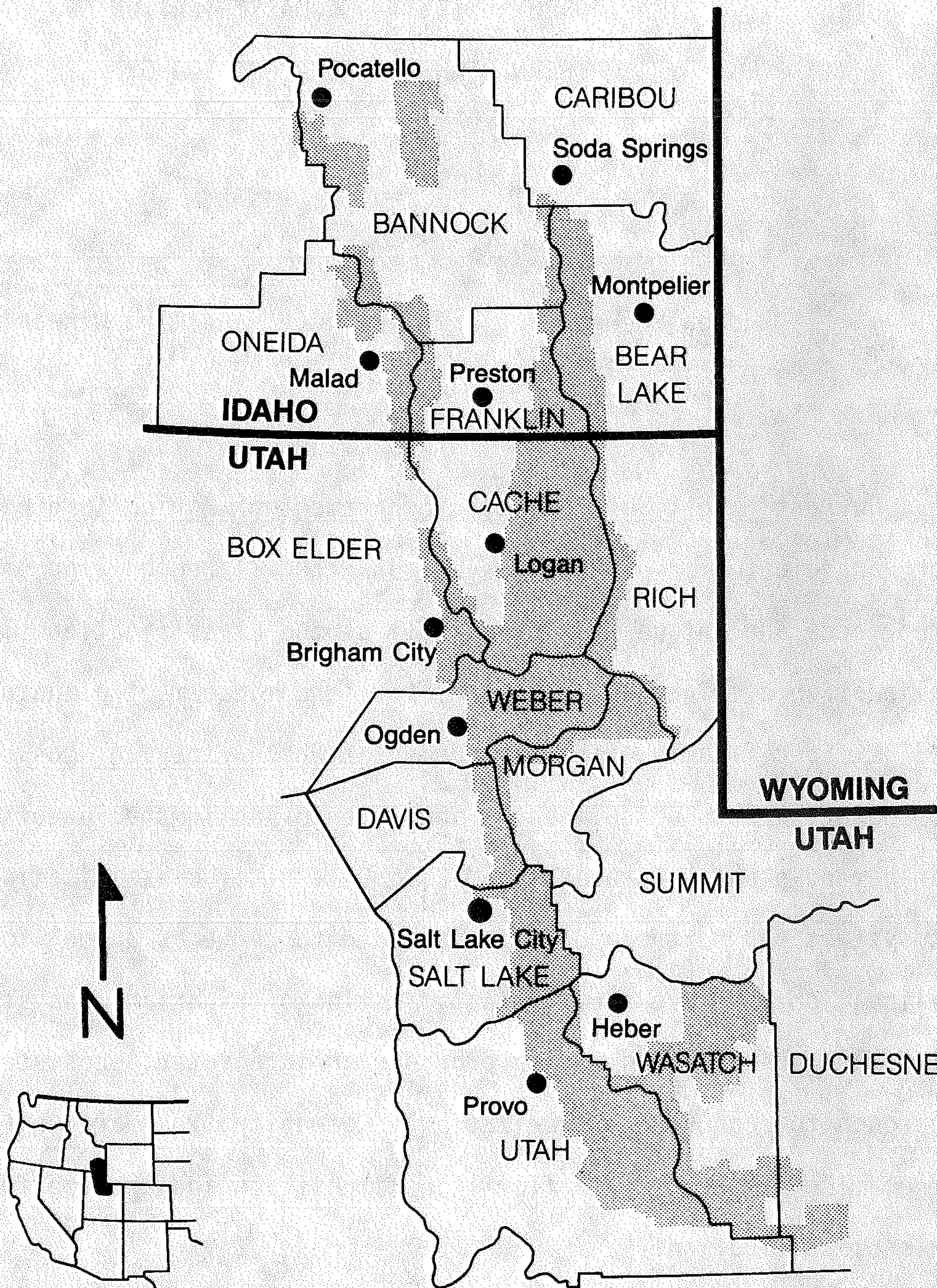

Figure 1. Area covered by this classification (shaded) showing States, counties, and major towns.

Objectives and Scope

The objectives of this study are:

1. To contribute to the broad regional classification program of the USDA Forest Service by developing a riparian community type classification for northern Utah and adjacent Idaho.

2. To describe the general geographic, topographic, edaphic, and floristic features of each type.

3. To describe the successional trends for each type where possible.

4. To present information on resource values and management opportunities for each type.

This classification is intended to cover all riparian ecosystems that occur repeatedly with the study area, and are large enough to be mapped at a reasonable scale for wildland management. In order to provide continuity with existing classifications of terrestrial ecosystems, portions of this work overlap with that of coniferous forests (Steele and others 1983; Mauk and Henderson 1984).

Purpose of this Draft

This report is considered a preliminary draft, and is reproduced for in-service distribution and training purposes. The release of this draft at this time will allow for additional field testing and the refinement of resource values and ratings. Users may forward recommendations for further improvement of the classification to the Ecology and Classification Program, Range and Watershed Management, Intermountain Region, USDA Forest Service, Ogden, UT.

METHODS

Fieldwork leading to development of this classification was initiated in June 1984, and was completed during September 1984. Analysis and classification development followed.

Field Methods

Reconnaissance of drainages was made prior to sample stand selection. Notes were made on the visually-dominant plant species and the locations of various riparian communities in the drainage for later revisitation. Plot selection was based on "subjective sampling without preconceived bias" as described by Mueller-Dombois and Ellenberg (1974). Plots were selected that reflect the apparent range of environmental and successional conditions of the area and the homogeneity of plant communities, rather than the eventual placement of the stand within a classification system.

In all 189 communities sampled, a non-permanent 50 m^2 (538 feet ^{2}) plot was used, most often with dimensions of 5 by 10 m (16 by 33 feet). Plot size was considered adequate to include most species of a community, yet small enough for the sampler to see the entire plot. To avoid sampling apparent ecotones between communities, each plot was placed within a reasonably homogeneous stand that was at least twice the area of the sample plot.

Canopy cover of all vascular plant species was ocularly estimated within each plot. Precision was to the nearest percent between 1 and 10 percent, and to the nearest 5 percent thereafter. Trace species (those with less than 1 percent cover) and those species present in the community but not in the sample plot were also noted. Plants not identified in the field were collected for later identification in the office.

Complete soil profile descriptions were made for 137 sample plots using standard methods (USDA-SCS 1975). Soil pits were dug to a depth of at least 1 m (39 inches) or to a restrictive layer of stone or cobble if less than 1 m. For the remaining 52 sample plots, general soil characteristics and tentative soil classification (taxonomy) were noted based upon hand-augered holes. In some instances, soils were collected for later determination of dry color. Depth to water table was noted when it occurred within the soil pit.

Other data collected for each plot included aspect, percent slope, position, configuration, evidence of recent disturbance, as well as notes on succession, community size and extent, and relationship to adjacent non-riparian or riparian plant communities. Elevation was estimated to the nearest contour using USGS 7½-minute topographic map.

The distribution of sample plots is presented in appendix A.

Office Methods

Development of the riparian community type classification followed the general procedure outlined below:

1. Voucher plant specimens were identified in the office or sent to the USDA Forest Service Intermountain Region Herbarium in Ogden or the Brigham Young University Herbarium in Provo, Utah. Field data forms were adjusted to reflect positive species identification.

2. Soils were classified to the family level using standard pedon description methods (USDA-SCS 1975). Available water capacity (inches of water/inch of soil) was estimated for the top 50 cm (20 inches) using guidelines developed by USDA-SCS (1981).

3. All field data were computer coded for vegetation and environment analyses. Preliminary association tables (Mueller-Dombois and Ellenberg

1974) were created using sample plot species and canopy coverage values. Association tables were rearranged several times to group stands with floristic similarities. A cluster analysis, using the Bray-Curtis similarity coefficient and unstandardized canopy coverage values with UPGMA clustering (Romesburg 1984), provided insights to community organization based upon numerical techniques.

4. To test the hypothesis that sampled communities within northern Utah represent range extensions of community types of eastern Idaho and western Wyoming, correlations were made with data used by Youngblood and others (1985). Sample plots were identified with the most appropriate riparian community type of eastern Idaho and western Wyoming using the computer program CLUSTID (Romesburg and Marshall 1984). In addition, ordination of Idaho, Wyoming, and Utah (Canopy coverage values) using detrended correspondence analysis (Hill and Gauch 1980) provided an objective approach to displaying individual species interactions and relationships between sample plots.

5. Based on the preliminary association tables, results of cluster analysis, the CLUSTID object identification program, and ordinations, grouping of plots within association tables were revised. When groups apparently represented extensions community types known from Idaho or Wyoming, data from selected stands within the Caribou Range of eastern Idaho was combined with the northern Utah data base for the purpose of creating a link between these areas and their resulting classifications. Finally, constancy and average coverage tables were created for each group using selected representative species.

6. A dichotomous key to the preliminary types was developed based on species dominance. Vegetation and environmental characteristics for the

types were identified and briefly described. The key was applied to all plots and necessary revisions were made to accommodate variations in these data. Less than 3 percent of the sample plots did not fit the resulting classification; these are briefly described in the Unclassified Stands section of the text.

7. A description was prepared for each riparian community type, including a map showing known locations. A general discussion of vegetation and physical environment, including soils and water table, as well as the relationships among adjacent riparian community types and upland vegetation, was prepared.

This classification can be used as a foundation for the management of riparian zones located within the study area boundaries. Wildlife, livestock, and fire effects studies can benefit from the basic descriptions provided in this classification. Fish habitat and streambank stability and stabilization studies can also be aided.

Taxonomic Considerations

Most plants were identified to the species level in the field. Particularly difficult specimens were sent for verification to the Forest Service Herbarium in Ogden or the Brigham Young University Herbarium in Provo, Utah, for positive identification. Plant identification was hampered by the lack of a complete and current flora that covers the entire study area. As a result, taxonomic nomenclature follows Goodrich (1983) for Salicaceae, Cronquist and others (1977, 1984) for the Monocotyledons and Asteridae except Asteraceae, Welsh (1983) for the Asteraceae, and Hitchcock and Cronquist (1973) for all other families.

Occasionally, some species presented problems when only vegetative material was available. Specimens of *Aster* and *Erigeron* species were

grouped as Aster spp. when no floral characteristics were available. Similarly, Rosa woodsii and Rosa nutkana were combined into the former. Vegetatively, small Juncus balticus and robust Juncus filiformus may be alike; we occasionally used J. balticus when positive identification was not possible. Poa palustris and Poa trivialis were often found occupying the same or similar sites, and may have overlapping ecological amplitudes. This characteristic, and their morphological similarity, suggested grouping them within the classification. Glyceria striata and Glyceria elata were lumped as G. striata because of an apparent overlap in environments.

Finally, some species, while easily distinguishable under field conditions, may occupy such similar habitats within the riparian zone and have correspondingly similar management implications that they were combined within the classification. Thus, Populus acuminata was combined with Populus angustifolia, and Picea pungens was combined with Picea engelmannii.

Specimens of Artemisia cana from throughout the study area were identified as subspecies viscidula.

SYNECOLOGICAL PERSPECTIVE AND TERMINOLOGY

The Community Type Concept

The community type is used as the basic unit of our riparian ecosystem classification. Recognition and naming of the community type is based on an initial ability to recognize communities. We consider communities as being somewhat homogeneous in all layers and differing from contiguous vegetation in either quantitative or qualitative characters (Daubenmire 1968). The community type is thus defined as an abstract grouping of all communities (stands) based upon floristic and structural similarities in

both overstory and undergrowth layers[1]. Some of our riparian communities consist of only a single layer of vegetation; we consider this the overstory and ignore all references to additional strata. Naming the community type follows the frequently-used system of a binomial set with the dominant overstory species separated from the dominant or most diagnostic indicator of the undergrowth union by a slash (Mueller-Dombois and Ellenberg 1974). Thus, a community characterized by *Betula occidentalis* in the overstory, and an undergrowth of *Cornus stolonifera* and various other shrubs, is identified and written as belonging to the BETULA OCCIDENTALIS/CORNUS STOLONIFERA community type. In order to maintain continuity and simplicity, we have chosen not be use trinomial nomenclature. We have also grouped several species because of apparent similarity in ecological amplitude. Therefore, stands comprised of *Salix drummondiana* or *Salix boothii*, and all combinations of the two, are together. We arbitrarily selected the species (*Salix boothii*, in this case) to use in the name.

Community types represent the existing structure and composition of communities, with no indication of successional status. They often describe conditions the resource manager may deal with on a day-by-day basis. The community type is a unit of vegetation that has no direct placement within a temporal setting. This is in contrast to the habitat type classification of land (site), in which time is held constant (Mauk and Henderson 1984). Habitat type classifications are based on the climax plant community, and describe the physical characteristics which allow that climax plant community to develop and persist. Our meager understanding of

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[1]Users may find it helpful to consult a glossary of important terms found in Appendix D.

successional relationships within riparian ecosystems prevents us from distinguishing all climax plant communities and their necessary site parameters. Indeed, the very concept of "climax" within the riparian zone may be tenuous. Our treatment involves distinguishing individual community types; successional trends connecting several community types may then be hypothesized.

Our classification is hierarchical. Community types may be aggregated upward into larger dominance groups which share a common physiognomy or overstory composition. This level of stratification may be useful for broad regional planning.

In developing the riparian community type classification, potentially important differential or diagnostic (indicator) species are evaluated in conjunction with stand characteristics and anticipated management strategies. Like most vegetation classifications, the variability within each community type must be carefully balanced against the variability between types. Many narrowly defined types may result in broad ecotones, while a few broadly defined types may reduce the ecotones. Our treatment is similar to previous work in other vegetation types (Mueggler and Campbell 1982) in that the acceptable level of within-type variability and the resulting ecotones are at least partially determined by the need for, and the projected use of, the final classification. For this reason, we have emphasized the structural characteristic of plant height and growth form such as tall shrub, low shrub, or forb. The written descriptions of our riparian community types portray modal conditions representative of the type. The key, however, is written in specific terms that narrow the ecotones for field identification and mapping.

Community types in general share certain traits with systematic taxonomy and ecology of plant species that may be encountered when using

classifications. Both community types and plant species have variable characteristics that complicate identification of the individual plant specimen or the specific community. Both are abstractions used to characterize most of the variation within a population of unknown size based upon a limited sample or subset. Closely related community types, like plants, share many traits and are distinguished by relatively few and sometimes obscure features. "Hybrid stands", like plants, are not uncommon, and are especially difficult to classify. When possible, we have allowed pertinent resource management practices to influence the treatment of these communities. Community types often have clear geographic distributions and variations that follow regional patterns of floristics and climate. Finally, endemic or disjunct distributions occur within community types as well as plant species.

Riparian Ecosystems and Communities

Within the mountainous portions of the western United States, the riparian zone is usually narrow, and often appears as lake or pond margins, seeps, bogs, or wet meadows when associated with a lentic (standing water) system, and river, stream, or spring edges near lotic (running water) systems. Riparian ecosystems have been defined in a number of ways, based on function (Thomas and others 1979a; Thomas and others 1979b), topography (Campbell 1970), and floristic composition (Pase and Layser 1977; Dick-Peddie and Hubbard 1977). We have chosen to define riparian ecosystems functionally as those areas of direct interaction between terrestrial (upland) and aquatic environments in a similar manner as Swanson and others (1982) and Meehan and others (1977), and yet have retained the characteristics of vegetation and soil as specific field identification features. Therefore, we have looked for plant communities

consisting of species that require more moisture than normally found on contiguous uplands and sites having soils with evidence of at least periodic high water tables.

Riparian ecosystems have a number of ecologically significant attributes that cause them to be critically important for wildland resource management. They are often the biological and physical links between terrestrial and aquatic ecosystems. Nutrients and energy pass through the riparian zone in almost continuous interactions (Likens and Bormann 1974). Riparian ecosystems have been studied recently for their high animal species densities (Anderson and others 1977) and species diversity (Hubbard 1977; Stevens and others 1977) resulting from a "packing" or increase of water, food, cover, and available habitat in close proximity. More than 32 percent of the terrestrial wildlife species known to inhabit the Wasatch-Cache National Forest are either largely or completely dependent on riparian ecosystems during one or more stage in their life cycle (Wasatch-Cache National Forest 1982). Other wildlife species and livestock may utilize these ecosystems in disproportion to their availability because of higher productivity, palatability of forage and browse, shade, and proximity to other valuable habitat components. Riparian ecosystems also have been noted for their relatively high endemism (Hubbard 1977) and relatively large number of endangered species (Johnson and others 1977). Plant species diversity may be high resulting from a mix of facultative and obligate riparian species. Historically, riparian zones have been utilized as transportation corridors by man. Many of our National Forest roads in the west have been built on the relatively gentle terrain within the riparian zone, where visual resource values may exceed those of the uplands. Finally, riparian ecosystems may serve as a buffer between man's

development and what may be his most vital natural resource--water (Odum 1979).

Riparian communities have a number of important and as yet unquantified relationships with aquatic ecosystems. Plant canopies influence water temperature and primary production in streams through shading, and contribute both coarse and find organic material. Large stems and accumulations of coarse debris influence channel configuration through the creation of pools and riffles. Streambank stability can be influenced by density and size of roots. Rooted plants add to the hydraulic resistance of the channel, thereby influencing discharge rates of water and sediments. Riparian communities may also filter sediments produced upstream.

Unlike adjacent terrestrial communities, water is more readily available for plant uptake in riparian zones, and duration of this free, unbound water may influence community composition. Often the lack of oxygen rather than water may limit plant growth, and riparian species may exhibit special adaptations, such as aerenchyma cells, to overcome this stress (Torrey and Clarkson 1975; Esau 1977). Communities associated with streams and rivers may have to contend with frequent scouring or deposition resulting from flooding. Riparian communities found along seeps or springs that have constant high water tables may be limited by continual accumulation of organic material.

THE PHYSICAL SETTING

Physiography and Geology

Almost all of the study area is located within the Middle Rocky Mountain Province (Fenneman 1931). Major mountain ranges from north to south include the Caribou (combined with the small Aspen Range spur), the

Bear River, Wasatch, and the southwestern flank of the Uinta Mountains. Only the isolated ranges to the west of the Bear River in southern Idaho belong to the Basin and Range Province.

The Caribou Range is part of a series of parallel mountains formed by close folding and thrust-faulting. This series includes the Big Hole, Snake River, Salt River, and Wyoming Ranges to the north and east of our study area. The entire complex, known as the Wyomide Ranges, straddle the Idaho-Wyoming state line. The western edge of the Caribou Range dips under the Snake River lava plains. Mountain tops approach 3 050 m (10,000 feet) in elevation. Slopes are relatively gentle and watersheds are dentritic in shape with low sideslope gradients and narrow riparian zones. Most of the range is drained by the Snake River, either directly or by major tributaries such as the Salt or Blackfoot River.

The Bear River Range extends from Soda Springs, Idaho, to some undefined point approximately 145 km (90 miles) south near the Cache-Weber County boundary. It is a north-south trending ridge system separated from the adjacent valleys on the east and west by fault systems. The uplifted fault block is capped by extensive deposits of Knight conglomerate of Tertiary Period (Stokes and Madsen 1961). Major rivers, such as the Logan and Blacksmith Fork, originate within this range, and have worn through early Paleozoic Era limestones and dolomites rocks. Stream gradients are relatively high, and sideslopes often steep. Riparian zones are usually narrow, and sometimes may abut vertical limestone cliffs. At higher elevations, especially near the Idaho-Utah border, Quaternary glaciation associated with the Naomi Peak-Mt. Magog complex has left scoured ground and moraine material. Riparian zones within these broad basins may be locally extensive. Essentially the entire range is drained by the Bear

River, which originates in the Uinta Mountains, flows north along the eastern flank of the Bear River Range, and then turns south at Soda Springs, Idaho. After flowing south through Cache Valley, it finally empties into the Great Salt Lake.

The Wasatch Range extends from a point near Brigham City, Utah, southward to Spanish Fork Canyon between Springville and Payson, Utah, a distance of about 180 km (110 miles). Elevations of the mountains at the northern end range from the valley floor formed by ancient Lake Bonneville at 1 280 m (4,200 feet) to about 2 710 m (8,900 feet). Closer to Salt Lake City and Provo, the crest is as high as 3 660 m (12,000 feet). Extensive fault zones parallel the western foot of the range. The western wall-like front is easily the most striking topographic feature of the entire range. Deep, V-shaped westerly trending canyons open into the Great Salt Lake Valley. Within the canyons, narrow riparian zones with steep sideslope gradients follow small dentritic streams. Upward movement of the Wasatch Range is greatest along the western face, and has exposed Precambrian schist and gneiss near Ogden and Precambrian quartzite and argillite along with Jurassic Period limestone near Salt Lake City (Stokes 1962). A thick cap of Tertiary granitoid rocks, showing evidence of Quarternary glaciation, occurs in the Little Cottonwood Creek area southeast of Salt Lake City. Further south, Paleozoic, Createaceous Period, and Tertiary Period limestones, mudstones, and conglomerates are exposed. The eastern flank of the Wasatch Range is composed of extensive deposits of Knight Formation conglomerate, formed during the Tertiary Period. Topography is more gentle, with rolling uplands and trellis-like drainage patterns. Major rivers crossing the Wasatch Range include the Weber and Provo, which empty into the Great Salt Lake.

The southwestern flank of the Uinta Mountains, which run east-west, is drained by the upper Provo and the Duchesne and Strawberry Rivers. Topography is relatively gentle and rolling, with most elevations under 2 740 m (9,000 feet). The northern portion, including the Mill Hollow and Wolf Creek area, has early Tertiary Period andesitic pryoclastics and Pennsylvanian Period sandstone exposed, while the southern half surrounding Daniels Canyon is a large thrust sheet of Paleozoic quartzite and limestone (Stokes and Madsen 1961).

The Basin and Range Province is represented by the small Bannock, Portneuf, and Malad Ranges in southern Idaho. These relatively low, rounded mountains extend from north to south, and are separated by broad valleys containing the Portneuf River.

Soils

Although vegetation is often the easiest feature to recognize in riparian ecosystems, characteristics of the soil, particularly soil moisture, ultimately influence the plant species composition. Soils of riparian ecosystems are usually more diverse than those of adjacent uplands. Textural and particle-size classes, organic matter accumulation and decomposition, and water table depths may be strongly contrasting, often resulting from past changes in stream channel width and position. Differences are usually more gradual around lakes or pond margins. A seasonally high water table is required for soils to be considered riparian. This situation may range from a few days annually to year-round. The depth at which soils are wet may also vary depending on both free water and capillary fringe. Where soils remain saturated for extended periods of time, biological activity (nutrient cycling and oxidation-reduction reactions) may be functioning in an anaerobic state. These gleyed soils,

characterized by the presence of ferrous iron and neutral gray colors, often change color rapidly when exposed to oxygen. When water tables fluctuate more frequently between alternating wet-dry periods, oxidation and reduction reactions may produce mottling with high chroma.

Soil textural and particle-size classes are often indicative of the type and degree of fluvial activity that has taken place. Surface horizons usually grade from coarse to fine away from previous channel axes. Buried horizons that are strongly contrasting may indicate channel positions or stream flows different from current conditions. Structural development also is helpful in hypothesizing the degree of in-situ pedogenesis.

Organic matter accumulation and decomposition proceed rapidly near the soil surface within the riparian ecosystem. Material is produced on-site or may be transported by fluvial processes. However, under anaerobic conditions, decomposition rates are almost negligible, and thick organic matter layers may develop over time. Recent fluvial deposition usually results in soils with irregular decreases in organic matter with depth. This contrasts with most upland soils containing a regular decrease with depth.

For classification purposes, soils were conisdered to have a cryic temperature regime if they occurred at or above 1 830 m (6,000 feet) in elevation, or frigid if lower in elevation. This was used as a guideline and not strictly adhered to at the northern latitudes of the study area.

Sampled riparian soils within the study area belong to four orders, based on the presence or absence of diagnostic horizons or broad features characteristic of the formative processes. Ten suborders are recognized, based upon major moisture or temperature regimes for the order. Great groups also involve differences of moisture and temperature, but are based

on soil properties rather than processes. Subgroups are named after characteristics that modify the previously-named features. Finally, the family taxa are used to group soils having similar physical and chemical properties that affect their responses to management.

Mollisols are the most frequently encountered soils within the riparian zones of our study area. This order includes those soils having a dark brown to black surface horizon (the mollic epipedon) that is relatively thick, has a high base saturation, and usually well developed structure. The mollic epipedon is primarily the result of underground decomposition of organic residues in the presence of bivalent cations such as calcium. These soils have formed under relatively stable conditions and have supported dense vegetation that usually includes graminoids. Sites are commonly found on alluvial terraces, broad valley bottoms, and gentle toeslopes away from the disruptive fluvial action of active streams. At the suborder level, Mollisols that are usually saturated, with little or no free dissolved oxygen for prolonged periods during the growing season (a reducing regime) have an aquic moisture regime, and are classified as Aquolls. Our Aquolls have either cryic or frigid temperature regimes and belong to the Cryaquoll or Haplaquoll great groups respectively. Subgroups are differentiated into Typic, Argic, Histic, Thapto Histic, Fluvaquentic, or Cumulic, based upon the presence or absence of an argillic horizon, histic epipedon, buried Histosol, irregular decrease in organic-carbon content with increasing depth, or mollic epipedon greater than 50 cm (20 inches) thick. Mollisols that are not saturated, have chroma more than 2, and lack distinct or prominent mottles, belong to the Boroll suborder. These soils all have cryic or frigid temperature regimes, and are thus classified as Cryoborolls or Haploborolls respectively. At the subgroup

level, our soils belonged to the Typic, Aquic, Fluvaquentic, Cumulic, Pachic, or Pachic-Udic taxa, depending upon the presence or absence of distinct or prominent mottles, a Cambic horizon, and thickness of the mollic epipedon. These Borolls often occur in the driest extremes of the riparian zone, and may extend up and outward, supporting non-riparian vegetation.

Inceptisols within our study area lack the development of Mollisols, yet have altered horizons with textures finer than fine sand (a cambic horizon). An aquic moisture regime indicated the Aquept suborder. Three great groups occur, including the cool Cryaquepts, the warm Humaquepts with mollic, umbric, or histic epipedons, and Haplaquepts, which lack the three diagnostic epipedons. Subgroups are differentiated into Typic, Aeric, Humic, Aeric-Humic, or Fluvaquentic based upon depth and color, or an irregular decrease in organic carbon content. Other Inceptisols infrequently encountered include Ochrepts and Umbrepts, which are determined by the presence or absence of an ochric epipedon. Subgroups include Typic, Entic, and Fluventic, based upon the presence or absence of a cambic horizon, or an irregular decrease in organic carbon content. Other Inceptisols infrequently encountered include Ochrepts and Umbrepts, which are determined by the presence or absence of an Ochric epipedon. Subgroups include Typic, Entic, and Fluventic, based upon the presence or absence of a cambic horizon, or an irregular decrease in organic carbon content.

Entisols in our study area are those soils that have little or no evidence of development of pedogenic horizons. A majority of our Entisols are the result of fluvial action with a resulting irregular decrease in organic carbon content with depth, thus they belong to the Fluvent

suborder. These include the relatively cool Cryofluvents and the warmer Udifluvents. Subgroups are either typic or Aquic depending upon the depth and fluctuation of the water table. A few of our sites in Big and Little Cottonwood Canyons near Salt Lake City, Utah are classified as Typic Cryaquents, based upon an aquic moisture regime.

Histosols are soils that contain a surface horizon of organic matter that is usually at least 40 cm (16 inches) thick. Suborders are distinguished by the degree of decomposition of the organic material and the presence of Sphagnum fibers. Most Histosols in our study area are fibric, with only partially decomposed wood and remains of herbaceous plants. These soils are usually permanently saturated with water, and have developed with cryic temperatures and very little free oxygen, resulting in slow decomposition. Sites conducive to such development include permanent bogs and seeps, some small drainages influenced by beaver dams, and broad valley bottoms with perched water tables.

The level of soil classification used throughout our work has been the family. Family differentiae for mineral soils are based primarily upon the particle-size class. Organic soils within the Histosol order are differentiated by particle size and mineral soil depth.

THE RIPARIAN COMMUNITY TYPE CLASSIFICATION

Thirty-seven riparian community types, within eight major physiognomic groups, have been defined for the northern Utah and southern Idaho study area. This seemingly large number of types reflects the environmental diversity resulting from topography, climate, geology, and converging floristic regimes, and also the influences of differing perturbations and successional processes. The term "community type" is used so frequently that the abbreviation c.t. is used for convenience. Frequent use of c.t.

names throughout the text also necessitates abbreviations. The commonly accepted practice of using the first two letters of the genus and species involved as the taxonomic name is followed throughout the text. For example, SALIX BOOTHII/CAREX ROSTRATA is reduced to SABO/CARO. Common names are not used within the text to avoid confusion resulting from variations due to local practices or customs.

The classification is presented in the following order:

1. Key to dominance groups and community types. The key provides an orderly process for first determining the major physiognomic or dominance group, and then the appropriate community type.
2. Community type descriptions. Detailed type descriptions summarize the distribution, physical environment, relative abundance of the characteristic vegetation, and general management implications.

Arrangement of c.t.'s within the key often proceeds from the most extreme site conditions to the most general, e.g., the more moist types are usually encountered before drier types. Likewise, undisturbed types are followed by disturbance types. Understanding this hypothesized ordination is often helpful when using of the classification. Appendix A lists the total number of sample points by c.t. and general vicinity. Relative abundance of a c.t. within the study area is indicated by the terms incidental, minor, or major. An incidental c.t. rarely occurs in more than one general vicinity such as a major drainage but may extend into our study area from elsewhere. A minor c.t. may be common as scattered sporadic occurrences throughout the study area, but seldom describes large units of vegetation. These often may be of major significance to resource managers as elements of diversity. A major c.t. may describe extensive acreages of vegetation in at least some drainages.

Users should note that the key is not the classification, but rather a tool to assist in using the classification. We have attempted to construct a key with very specific terms that will narrow the ecotones for field identification. In contrast, the type descriptions are generalized to portray modal conditions. In any classification effort, and especially in dynamic ecosystems such as riparian zones, some variation is expected within all classified types. The user is cautioned to validate the determination made using the key by checking the written descriptions and supporting appendixes <u>before</u> leaving the stand or plot.

KEY TO RIPARIAN COMMUNITY TYPES OF NORTHERN UTAH AND ADJACENT IDAHO

READ THESE INSTRUCTIONS FIRST:

1. Use this key for riparian communities within or adjacent to the Bear River portion of the Caribou National Forest in southern Idaho or the Wasatch-Cache and Uinta National Forests in Utah.
2. Locate 50 m^2 sample plot in representative portion of the stand.
3. Accurately identify and record canopy coverages for all indicator species as listed on the field form (appendix E).
4. Check plot data in the field to verify that the plot is representative of the stand as a whole, using recorded canopy coverage values. If not representative, locate another plot.
5. While in the plot, identify the correct Overstory Dominance Group. In general, a species or group of species will appear to dominate the community if canopy coverage is about 25 percent.
6. Within the appropriate Group, key to community type by following the key literally. Verify the identification by comparing the stand's composition and site characteristics with the written descriptions.
7. Remember, the key is NOT the classification! Validate the determination made using the key by checking the written description and appendix B.

KEY TO OVERSTORY DOMINANCE GROUPS

1. Trees dominating overstory with cover usually exceeding 25 percent cover . . . . . . GROUP A

1. Trees not dominating overstory 2

    2. Shrubs dominating overstory 3

    2. Shrubs not dominating overstory 7

3. _Salix_ species dominating overstory 4

3. _Salix_ species not dominating overstory . . . . GROUP B

    4. _Salix_ _geyeriana_ dominating overstory with cover usually exceeding 25 percent. . . . GROUP C

    4. _Salix_ _geyeriana_ not dominating overstory 5

5. _Salix_ _boothii_ or _Salix_ _drummondiana_ dominating overstory with cover of one or both species usually exceeding 25 percent . . . . . GROUP D

5. *Salix boothii* or *Salix drummondiana* not dominating overstory 6

6. *Salix wolfii* or *Betula glandulosa* dominating overstory with cover usually exceeding 25 percent. . . . . GROUP E

6. Not as above. Other *Salix* species dominating overstory . . . . GROUP F

7. Graminoids dominating the community . . . . . GROUP G

7. Graminoids not dominating the community forbs the dominant lifeform. . . . . GROUP H

GROUP A. Key to Tree-Dominated Community Types

1. *Picea engelmannii*, *Picea pungens*, *Abies lasiocarpa*, or *Pinus contorta* dominating the overstory with at least 25 percent cover, either separately or collectively 2

1. Not as above 3

   2. *Cornus stolonifera* at least 25 percent cover . . . . PICEA/CORNUS STOLONIFERA c.t. (p. 35)

   2. *Cornus stolonifera* less than 25 percent cover. *Actaea rubra*, *Galium triflorum*, *Senecio triangularis*, *Smilacina stellata* or *Thalictrum* spp. at least 5 percent cover, either separately or collectively . . . . PICEA/GALIUM TRIFLORUM c.t. (p. 35)

3. *Betula occidentalis* at least 25 percent . . . BETULA OCCIDENTALIS/CORNUS STOLONIFERA c.t. (p. 36)

3. *Betula occidentalis* less than 25 percent cover. 4

   4. *Populus angustifolia* or *Populus acuminata* at least 25 percent cover 5

   4. Not as above, *Acer negundo* at least 25 percent cover 6

5. *Cornus stolonifera* at least 25 percent cover . . POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA c.t. (p. 39)

5. Not as above. *Poa pratensis* typically at least 25 percent cover . . . . POPULUS ANGUSTIFOLIA/POA PRATENSIS c.t. (p. 41)

   6. *Cornus stolonifera* at least 25 percent cover . . . . ACER NEGUNDO/CORNUS STOLONIFERA c.t. (p. 43)

   6. Not as above, *Equisetum arvense* at least 25 percent cover . . . . ACER NEGUNDO/EQUISETUM ARVENSE c.t. (p. 44)

GROUP B. Key to Mixed Shrub-Dominated Community Types

1. Alnus incana or Ribes hudsonianum at least 25 percent cover. . . . . ALNUS INCANA/RIBES HUDSONIANUM c.t. (p. 45)

1. Not as above 2

   2. Cornus stolonifera at least 25 percent cover . . . . CORNUS STOLONIFERA c.t. (p. 46)

   2. Cornus stolonifera less than 25 percent cover 3

3. Potentilla fruticosa at least 5 percent cover. 4

3. Potentilla fruticosa less than 5 percent cover; Artemisia cana the dominant shrub. . . . . . . ARTEMISIA CANA/POA PRATENSIS c.t. (p. 50)

   4. Deschampsia cespitosa at least 5 percent cover . . . . POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA c.t.* (p. 48)

4. *Deschampsia cespitosa* less than 5 percent cover. *Poa pratensis* at least 5 percent cover. . . . . POTENTILLA FRUTICOSA/POA PRATENSIS c.t. (p. 49)

GROUP C. Key to *Salix geyeriana*-Dominated Community Types

1. *Carex rostrata* and/or *Carex aquatilis* at least 25 percent cover . . . . SALIX GEYERIANA/CAREX ROSTRATA c.t.* (p. 51)

1. Not as above 2

2. *Heracleum lanatum* or *Smilacina stellata* at least 5 percent cover together or alone . . . . SALIX GEYERIANA/MESIC FORB c.t.* (p. 53)

2. Not as above. *Poa pratensis* usually present . . . . SALIX GEYERIANA/POA PRATENSIS c.t.* (p. 53)

GROUP D. Key to _Salix boothii_-Dominated Community Types

1. _Carex rostrata_ and/or _Carex aquatilis_ at least 25 percent cover together or alone, or dominant undergrowth species in depauperate undergrowth . . . . SALIX BOOTHII/CAREX ROSTRATA c.t. (p. 55)

1. Not as above 2

   2. _Carex nebrascensis_ at least 25 percent cover . . . . SALIX BOOTHII CAREX/ NEBRASCENSIS c.t.* (p. 57)

   2. _Carex nebrascensis_ less than 25 percent cover. 3

3. _Calamagrostis canadensis_ at least 25 percent cover . . . . SALIX BOOTHII/ CALAMAGROSTIS CANADENSIS c.t.* (p. 57)

3. _Calamagrostis canadensis_ less than 25 percent cover. 4

4. *Equisetum arvense* at least 25 percent cover or dominant understory herb. . . . SALIX BOOTHII/EQUISETUM ARVENSE c.t.* (p. 59)

4. *Equisetum arvense* less than 25 percent cover 5

5. Undergrowth clearly dominated by a single species or a mixture of forbs such as *Heracleum lanatum*, *Smilacina stellata*, or *Mertensia ciliata* . . . . SALIX BOOTHII/SMILACINA STELLATA c.t. (p. 59)

5. Not as above. Undergrowths conspicuously dominated by graminoids such as *Poa pratensis* . . . . SALIX BOOTHII/POA PRATENSIS c.t. (p. 61)

GROUP E. Key to *Salix wolfii*-Dominated Community Types

1. *Carex aquatilis* at least 25 percent cover or *Pedicularis groenlandica* at least a codominant . . . . SALIX WOLFII/CAREX AQUATILIS c.t.* (p. 63)

1. Not as above 2

2. _Deschampsia_ _cespitosa_ at least 5 percent cover . . . . SALIX WOLFII/ DESCHAMPSIA CESPITOSA c.t.* (p. 63)

2. _Deschampsia_ _cespitosa_ less than 5 percent cover _Smilacina_ _stellata_ or _Mertensia_ _ciliata_ usually present . . . . SALIX WOLFII/MESIC FORB c.t.* (p. 64)

GROUP F Key to Additional _Salix_-Dominated Community Types

1. _Salix_ _exigua_ at least 25 percent cover 2

1. _Salix_ _exigua_ less than 25 percent cover. _Salix_ _lutea_ or _Salix_ _lasiandra_ at least 25 percent cover . . . . SALIX LUTEA c.t.* (p. 67)

2. _Equisetum_ _arvense_ at least 5 percent cover or _Calamagrostis_ _canadensis_ at least 25 percent cover . . . . SALIX EXIGUA/EQUISETUM ARVENSE c.t. (p. 65)

2. Not as above. *Poa pratensis* usually present . . . . SALIX EXIGUA/POA PRATENSIS c.t. (p. 66)

GROUP G. Key to Graminoid-Dominated Community Types

1. *Carex* species dominating the overstory 2

1. Not as above. Other graminoids dominating the overstory 5

2. *Carex rostrata* at least 50 percent cover or dominating the overstory . . . . CAREX ROSTRATA c.t. (p. 69)

2. Not as above 3

3. *Carex aquatilis* at least 25 percent cover or dominating the overstory . . . . CAREX AQUATILIS c.t.* (p. 72)

3. Not as above 4

4. *Carex microptera* at least 25 percent cover or dominant overstory species . . . CAREX MICROPTERA c.t.* (p. 69)

4. Not as above, _Carex_ _nebrascensis_ at least 25% cover or dominating the overstory. . . . . CAREX NEBRASCENSIS c.t.* (p. 73)

5. _Juncus_ _balticus_ at least 25 percent cover or dominating the overstory . . . . . . JUNCUS BALTICUS c.t.* (p. 74)

5. Not as above. Grasses dominating the overstory 6

6. _Deschampsia_ _cespitosa_ at least 25 percent cover or the dominant graminoid in the overstory . . . . DESCHAMPSIA CESPITOSA c.t.* (p. 76)

6. Not as above. _Poa_ _pratensis_ at least 5 percent cover. . . . . POA PRATENSIS c.t. (p. 77)

GROUP H. Key to Forb-Dominated Community Types

1. _Veratrum_ _californicum_ at least 50 percent cover . . . . VERATRUM CALIFORNICUM c.t.* (p. 78)

1. *Veratrum californicum* less than 50 percent cover.

Mertensia ciliata or *Senecio triangularis*

at least 25 percent cover together or alone . MERTENSIA CILIATA c.t.*

(p. 78)

*Incidental or minor community type, may be omitted from other charts or tables.

PICEA/CORNUS STOLONIFERA c.t.

(PICEA/COST)

DISTRIBUTION.- A single community within the Logan River drainage is used to extend the distribution of the PICEA/COST c.t. southward from eastern Idaho and western Wyoming.

VEGETATION.- The stand contains mature Abies lasiocarpa and remnant Populus tremuloides in the overstory. The undergrowth is shrubby, and is dominated by Cornus stolonifera.

SOILS.- Soils are classified as cumulic Cryaquolls. Family particle-size class is fine loamy over loamy-skeletal.

OTHER STUDIES.- The PICEA/COST c.t. is discussed in detail by Youngblood and others (1985), based upon its frequent occurrence within the Greys River drainage in Wyoming. Our example from northern Utah is similar in vegetation and site characteristics.

PICEA/GALIUM TRIFLORUM c.t.

(PICEA/GATR)

DISTRIBUTION.- This minor c.t. occurs infrequently throughout the study area. It occurs more commonly in Idaho, Wyoming, and Montana. Within northern Utah, it occurs on benches or terraces that normally escape seasonal flooding. Adjacent communities are typically coniferous forests.

VEGETATION.- Stands contain a mixture of conifers, including Picea engelmannii, Picea pungens, and Abies lasiocarpa. Occasionally, remnant clumps of Populus angustifolia may exist, representing an earlier successional stage. The often lush undergrowth is characteristically forby, and includes Aconitum columbianum, Actaea rubra, Galium triflorum, Heracleum lanatum, or Smilacina stellata. A light shrub canopy may

sometimes overtop this layer; it includes _Amelanchier alnifolia_, _Alnus incana_, _Lonicera involucrata_, or _Symphoricarpos oreophilus_.

SOILS.- Although soils may contain at least 35 percent rock fragments at lower depths, the upper horizons are usually composed of loamy material. Available water capacity is low to moderate.

SUCCESSION/MANAGEMENT.- Our stands belong to several habitat types, including ABIES LASIOCARPA/ACTAEA RUBRA, ABIES LASIOCARPA/ACER GLABRUM, and PICEA ENGELMANNII/EQUISETUM ARVENSE (Mauk and Henderson 1984). North of this study area, the PICEA/GATR has also been noted to occur on sites belonging to the PICEA ENGELMANNII/GALIUM TRIFLORUM habitat type (Youngblood and others 1985). This seemingly wide variability in site characteristics indicates the adaptability or amplitude of members of this riparian c.t. Although it was considered to represent climax conditions in eastern Idaho and western Wyoming (Youngblood and others 1985), this c.t. apparently is a long-term or persistent stage of several different successional seres.

OTHER STUDIES.- Youngblood and others (1985) present a more detailed description of this c.t. based upon its frequent occurrence in Wyoming and Idaho. Pfister and others (1977) discuss similar conditions for south-central Montana.

BETULA OCCIDENTALIS/CORNUS STOLONIFERA c.t.
(BEOC/COST)

DISTRIBUTION.- The BEOC/COST c.t. is a major type with the study area, and is found at lower elevations along major streams throughout the Bear River and Wasatch Ranges. It also occurs in the Bannock and Caribou Ranges of southern Idaho. It generally ranges between 1 520 and 1 980 m (5,000 and 6,500 feet) in elevation; the c.t. extends down to about 1 450 m (4,760

feet) near Logan, Utah. The type occurs most often adjacent to streams on gently sloping terraces or rather steep sideslopes, usually with southwest aspects. Surface topography is sometimes undulating as a result of frequent deposition from seasonal high water. Adjacent communities include stands of Populus angustifolia or Acer negundo; non-riparian communities may be dominated by Artemisia tridentata ssp. vaseyana, Pseudotsuga menziesii, or Acer grandidentatum.

VEGETATION.- A normally dense canopy of Betula occidentalis characterizes the overstory. Multiple stems arise in clumps, and branches may extend outward for several meters. Other trees which may be associated with this c.t. include Acer negundo, Acer grandidentatum, and Populus angustifolia; these usually represent ecotonal conditions on slightly drier sites. One stand near Logan, Utah, contained Fraxinus americana. Several of our sample stands contain high coverages of Populus angustifolia; we have chosen to emphasize the presence of Betula occidentalis over that of P. angustifolia because of apparent site characteristics. Further work may indicate the need to treat the combination of B. occidentalis and P. angustifolia as a separate c.t., especially for avian habitat values. The undergrowth is variable. Most stands contain a dense shrub stratum conspicuously dominated by Cornus stolonifera. Other shrubs include Alnus incana, Amelanchier alnifolia, Lonicera involucrata, Rosa woodsii, and Salix lutea. One stand near American Fork, Utah, contained both Rhus radicans and Rhus trilobata; these may indicate an incorporation of central Utah floristic elements. A few stands lacked the shrub stratum entirely; overall similarity of associated graminoids and forbs, in addition to the general site characteristics, lead to the eventual lumping of all sample stands into a single c.t. The most common graminoid is Poa pratensis,

while Smilacina stellata, Osmorhia chilensis, Heracleum lanatum, and sometimes Geranium richardsonii may be present.

SOILS.- The BEOC/COST c.t. occurs on a wide variety of soils, including Typic Haplaquolls, Aquic Cryoborolls, and Aquic or Typic Haploborolls (appendix C). The fine earth fraction may vary from clayey to sandy, with most soils containing at least 35 percent rock fragments. Surface horizons are usually recently deposited material, with sandy, sandy loam, or loam textures. Exposed rock may cover up to 30 percent of the surface. Although both bare ground and litter average slightly more than 30 percent of the surface, some stands may occur with either exposed soil or litter exceeding 90 percent of the surface. Our sites usually have a deep water table; only about one half the sites had a water table within 50 cm (20 inches). A few soils contain mottles as evidence of fluctuating water tables when the table was not observed within one meter (39 inches). Available water capacity ranges from high to low.

SUCCESSION/MANAGEMENT.- This c.t. appears to represent relatively stable conditions. Although seasonal flooding may be a common event, the effects are generally restricted to deposition of fine sands and gravels. This may increase the incorporation of organic matter resulting from leaf and twig fall. Scouring generally should be limited to the most severe runoff events. Dense root systems of both tree and shrub strata will anchor banks; in the few cases where shrubs are not present, streambanks may already be armored with rock. Management emphasis should be given to retention of the BEOC/COST c.t. for its streambank stabilization and structural diversity with resulting wildlife habitat values, especially for avian species. Presumably, highest values may exist for cavity-dependent species utilizing mature Betula occidentalis and Populus angustifolia.

This c.t. may also be important for fish habitat; the streamside edge of the community often overhangs the stream channel, providing shade and organic matter. Forage for livestock is negligible. The area previously supporting this c.t. in northern Utah has apparently been severly impacted by the building of roads, summer homes, and recreation sites.

OTHER STUDIES.- No other studies have identified this c.t. Youngblood and others (1985) sampled two communities near Palisades Reservoir along the Idaho-Wyoming border; they were treated as belonging to the POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA or CORNUS STOLONIFERA/HERACLEUM LANATUM c.t. depending upon overstory.

POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA c.t.

(POAN/COST)

DISTRIBUTION.- The POAN/COST is a major c.t., found predominantly within the Wasatch Range. It also extends northward into Idaho along the Caribou and Big Hole Ranges. It typically occurs on alluvial benches or terraces adjacent to large streams and rivers. These sites may be infrequently impacted by fluvial deposition or scouring. Stands are generally below 1 830 m (6,000 feet) in elevation, and have southwest aspects. Adjacent communities include forests dominated by _Acer negundo_ or _Pseudotsuga menziesii_, and riparian communities of _Salix lutea_ and _Salix lasiandra_.

VEGETATION.- _Populus angustifolia_ usually dominates the tall overstory. One stand near the south end of Cache Valley contains _Populus acuminata_ instead of _P. angustifolia_. Conifers may occasionally be present but are clearly subordinate. _Acer negundo_, _Acer grandidentatum_ or _Betula occidentalis_ usually represent ecotonal conditions. A dense, tall shrub is dominated by _Cornus stolonifera_ but may also include _Alnus incana_,

Amelanchier alnifolia, Rosa woodsii, and Salix lutea. Elymus glaucus and Poa pratensis are the most common herbaceous species.

SOILS.- Soils supporting the POAN/COST c.t. within our study area include Cumulic Haplaquolls and Fluventic Haplumbrepts (appendix C). Particle-size classes vary, but most soils contain at least 35 percent rock fragments. Water table is typically lower than the depth of the soil pit, although distinct or prominent mottles are commonly present within the control section. Available water capacity ranges from low to moderate.

SUCCESSION/MANAGEMENT.- North of our study area, the POAN/COST c.t. appears to be replaced successionally by stands of Picea engelmannii or Picea pungens (Youngblood and others 1985). Within Utah, this pathway is not as evident. Both Populus angustifolia and Cornus stolonifera were noted very infrequently during fieldwork leading to the development of the coniferous forest habitat type classification (unpublished data on file, Forestry Sciences Laboratory, Logan, Utah). In a few situations, sites belonging to either the PSEUDOTSUGA MENZIESII/ACER GLABRUM or ABIES LASIOCARPA/ACER GLABRUM habitat type (Mauk and Henderson 1984) may have supported our POAN/COST c.t. However, this c.t. is more likely to be gradually replaced by Acer negundo or Acer grandidentatum communities. Cornus stolonifera may not always persist following an overstory conversion. Throughout the Wasatch Front, this c.t. has apparently been greatly impacted by the development of recreational sites, roads, and summer homes. We suggest management emphasis should be given to the retention of the POAN/COST c.t. because of its structural diversity where wildlife habitat values are important, as well as its streambank protection and shading of fish habitat.

OTHER STUDIES.- Youngblood and others (1985) have described the POAN/COST c.t. from low elevations of eastern Idaho and western Wyoming. This treatment for Utah maintains the concept of the type, and extends its distribution southward.

POPULUS ANGUSTIFOLIA/POA PRATENSIS c.t.

(POAN/POPR)

DISTRIBUTION.- POAN/POPR is a major c.t. of the study area, and occurs throughout the Bear River and Wasatch Ranges. It also extends northward into the Caribou and Snake River Range of eastern Idaho. It most often occurs on gently sloping alluvial terraces or floodplains of major streams and rivers between 1 520 and 1 830 m (5,000 and 6,000 feet) in elevation. It was, however, sampled as high as 2 270 m (7440 feet) along Current Creek north of Strawberry Reservoir. Adjacent riparian communities often include Salix exigua or Cornus stolonifera as dominant species. Neighboring upland communities are composed of Juniperous osteosperma, Quercus gambelii, or Artemisia tridentata.

VEGETATION.- Populus angustifolia dominates the overstory. One stand sampled near Preston, Idaho is somewhat unique in having Populus acuminata rather than P. angustifolia. Underneath the canopy of P. angustifolia, lesser amounts of Acer negundo, Acer grandidentatum, and sometimes Betula occidentalis may form a dense strata. Shrubs and half-shrubs such as Amelanchier alnifolia, Berberis repens, Rosa woodsii, or Symphoricarpos oreophilus may form a sparse, low layer. The undergrowth is conspicuously dominated by graminoids. Although Poa pratensis has the highest constancy and average cover, other grasses such as Agrostis stolonifera, Dactylis glomerata, or Elymus glaucus may frequently be present in high coverages and conceal the P. pratensis. Osmorhiza chilensis is the most common forb.

SOILS.- Many soils are classified as Haploborolls (appendix C), and have at least 35 percent rock fragments in subsurface horizons. The water table is typically lower than the depth of the soil pit. Available water capacity ranges from low to high.

SUCCESSION/MANAGEMENT.- Limited data indicate a gradual conversion of this c.t. to one dominated by Acer grandidentatum or Acer negundo. Although invasion by Acer is slow, it appears to be the result of infrequent surface disturbance by fluvial processes. Throughout lower elevations of the study area, stream and river channels have been restricted due to establishment of recreational developments, transportation corridors, and summer home sites. Channel morphology has changed, with the elimination or restriction of frequent overland flow necessary to maintain the POAN/POPR c.t. POAN/POPR is apparently one of the driest riparian situations, with many non-riparian plant species commonly associated. However, these sites do occasionally flood, resulting in seedbeds for Populus regeneration. Periodic disturbances, such as occasional livestock browing, may also stimulate suckering. Deep-seated roots of Populus are able to utilize water that may be below the rooting depths of most obligate riparian species. Wildlife management options should normally emphasize requirements for cavity-dependent species.

OTHER STUDIES.- This c.t. has been described from eastern Idaho and western Wyoming by Youngblood and others (1985). This treatment for Utah maintains previous concepts except for the refinement of successional relationships involving Acer species.

ACER NEGUNDO/CORNUS STOLONIFERA c.t.

(ACNE/COST)

DISTRIBUTION.- The ACNE/COST c.t. occurs as a minor type throughout the southern half of the Bear River Range and along the Wasatch Front. It was sampled as far north as Logan, Utah; small patches may occur into extreme southern Idaho. It generally occurs below 1 830 m (6,000 feet) in elevation, and represents a narrow streamside band that occurs zonally above the BETULA OCCIDENTALIS/CORNUS STOLONIFERA c.t. Adjacent communities are often non-riparian forests, and may be dominated by *Acer negundo*, *Pseudotsuga menziesii*, or *Abies concolor*.

VEGETATION.- *Acer negundo* is usually the only tree in the community; occasionally small amounts of *Abies concolor*, *Abies lasiocarpa*, *Acer grandidentatum*, or *Betula occidentalis* may be found. These species will normally represent accidental establishment or ecotonal conditions, rather than successional trends. *Acer negundo* appears to maintain dominance of these sites through a combination of seeding and root collar suckering. A normally dense shrub stratum is dominated by *Cornus stolonifera*, but may also include *Rosa woodsii*, *Salix lutea*, or *Alnus incana*. The most common grass is *Poa pratensis*. Common forbs include *Smilacina stellata* and *Actaea rubra*, or *Arctium minus* following disturbance.

SOILS.- Soils are predominately Cumulic Haplaquolls, with at least 35 percent rock fragments present within the control section (appendix C). Fine earth fraction is usually coarse- or fine-loamy. A single stand at the south end of the Wasatch Range is similar floristically to all others; however, the soils are very sandy and are classified as Entic Cryumbrepts, sandy-skeletal. Water tables are generally below 1 m (39 inches). Available water capacity is variable.

SUCCESSION/MANAGEMENT.- The ACNE/COST c.t. appears to represent either highly persistent or stable conditions. Limited data suggest the occurrence of a climax c.t. dominated by *Acer negundo* and *Smilacina stellata*. Thus, as either organic matter accumulates or water tables drop, *Cornus stolonifera* may die, leaving a typical deciduous forest community with herbaceous undergrowth. However, this hypothesized conversion is apparently very slow. We suggest the ACNE/COST c.t. be managed as a stable type. Emphasis should be given to its structural diversity and protection of streambanks.

OTHER STUDIES.- No other studies have identified this c.t.

ACER NEGUNDO/EQUISETUM ARVENSE c.t.
(ACNE/EQAR)

DISTRIBUTION.- The ACNE/EQAR c.t. is tentatively named based upon limited sampling. It occurs near Salt Lake City and Spanish Fork, Utah, on benches or terraces which escape active fluvial deposition or scouring. Elevations are low, and stands have southwest aspects. Adjacent communities are non-riparian, and are usually dominated by *Acer negundo*.

VEGETATION.- *Acer negundo* is the only tree within the community. The undergrowth is conspicuously dominated by *Equisetum arvense*. Cover of shrubs and forbs other than *Smilacina stellata* is negligible.

SOILS.- Limited soils data suggest no discernable relationships.

SUCCESSION/MANAGEMENT.- Until further field studies are conducted, we are unable to clarify successional relationships for this possible type. Our basis for suggesting its existence, with only limited data, is the high similarity within the few sample stands, and the low similarity with all other stands containing *Acer negundo*. Thus, it appears to be a very clean, although uncommon type. Also, management implications are likely quite

different between this and our ACER NEGUNDO/CORNUS STOLONIFERA c.t. because of structural dissimilarities. We suggest sites supporting this ACNE/EQAR c.t. be managed to restrict surface-disturbing activities.

OTHER STUDIES.- No other studies have described the ACNE/EQAR c.t.

ALNUS INCANA/RIBES HUDSONIANUM c.t.

(ALIN/RIHU)

DISTRIBUTION.- The ALIN/RIHU is a major riparian c.t. of the Bear River and Wasatch Ranges. It also extends northward into Wyoming, Idaho, and Oregon. Within Utah, the type is found most often as narrow stringer communities immediately adjacent to small perennial streams. It also occurs along some of the major rivers of the area, such as the Logan, Blacksmiths Fork, and Little Cottonwood. Sites range in elevation from 1 710 to 2 320 m (5,600 to 7,600 feet), and usually have undulating surface topographies. Zonally, the ALIN/RIHU c.t. usually occurs on sites at higher elevations than our BETULA OCCIDENTALIS/CORNUS STOLONIFERA, POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA, or ACER NEGUNDO/CORNUS STOLONIFERA c.t. Neighboring riparian communities, especially where valley bottoms are relatively wide, may be dominated by _Salix boothii_ or _Salix drummondiana_. Adjacent non-riparian communities may be coniferous forests of _Abies lasiocarpa_, _Abies concolor_, or _Pseudotsuga menziesii_, or stands of _Artemisia tridentata_ ssp. _vaseyana_ or _Quercus gambelii_.

VEGETATION.- A dense and relatively tall (3 to 4 m, 10-14 feet) canopy of _Alnus incana_ characterizes most communities. Occasionally, _A. incana_ may be lacking, and the dominant shrub is _Ribes hudsonianum_. Although _Cornus stolonifera_ has higher constancy and average cover than _R. hudsonianum_, overall similarity with conditions in Idaho and Wyoming suggested the appropriateness of maintaining the concept as established by

Youngblood and others (1985). In addition to _Cornus stolonifera_, _Lonicera involucrata_ and small amounts of _Rosa woodsii_ may be found. A normally sparse herbaceous layer includes _Elymus glaucus_, _Poa pratensis_, _Heracleum lanatum_, _Smilacina stellata_, or _Equisetum arvense_.

SOILS.- Soils usually contain at least 35 percent coarse fragments. Typic Cryaquolls or Typic Cryaquents are common (appendix C). Fine earth fraction is variable, and includes clayey, loamy, and sandy particle-size classes. Water table depths and available water capacity are variable.

SUCCESSION/MANAGEMENT.- These communities appear relatively stable. _Alnus incana_, _Cornus stolonifera_, and _Ribes hudsonianum_ can tolerate severe flooding and resist scouring, thus providing protection for streambanks. Vertical structural diversity within this c.t. may indicate the availability of habitat for many avian species. Browse is also available. This c.t. also provides shading for fish habitat.

OTHER STUDIES.- Youngblood and others (1985) described the ALIN/RIHU c.t. for portions of eastern Idaho and western Wyoming. Our treatment for northern Utah maintains previous concepts. Somewhat similar communities dominated by _Alnus_ have been described by Tuhy and Jensen (1982) and Mutz and Queiroz (1983) for central Idaho, and Padgett (1981) for eastern Oregon.

CORNUS STOLONIFERA c.t.

(COST)

DISTRIBUTION.- Communities dominated by _Cornus stolonifera_ represent a major c.t. throughout much of the study area. Similar communities also have been described for western Wyoming and portions of Idaho. Within our study area, the COST c.t. was found on gentle to moderate slopes adjacent to streams or rivers. Elevations range from near 1 740 m (5,700 feet)

within the Bannock and Caribou Ranges to over 2 180 m (7,150 feet) at the southern end of the Wasatch Range. Zonally, this represents an overlap with the ACER NEGUNDO/CORNUS STOLONIFERA or POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA c.t. at lower elevations, and the ALNUS INCANA/RIBES HUDSONIANUM c.t. at higher elevations. Other adjacent communities may be dominated by Pseudotsuga menziesii, Acer grandidentatum, or Artemisia tridentata ssp. vaseyana.

VEGETATION.- Cornus stolonifera clearly dominates the overstory of these communities. Occasionally, other shrubs such as Salix lutea, Salix exigua or Rosa woodsii may be present with high averages. Various graminoids and forbs may be present, with coverages generally low. Species with the highest constancy include Poa pratensis, Heracleum lanatum, Smilacina stellata, and Urtica dioica. One stand in the Bear River Range has high cover of Equisetum arvense, and also Populus tremuloides in the overstory.

SOILS.- Common soils include Cryaquolls, Haplaquolls, or Haploborolls with thick mollic epipedons and aquic moisture regimes (appendix C). Fine earth fraction is generally loamy or coarse-loamy, with about half the soils containing at least 35 percent rock fragments within the control section. Horizon boundaries are often abrupt and strongly contrasting, and may indicate past fluvial deposition. However, the organic carbon content is assumed to be sufficient throughout the upper horizons sufficient to meet the criterion of mollic epipedon; this may indicate the relative stability of these sites. Water tables are generally below 100 cm (39 inches) in depth. Available water capacity ranges from low to moderate.

SUCCESSION/MANAGEMENT.- The COST c.t. represents relatively stable vegetation, with little potential for major change. Only at the

elevational extremes may associated species gradually gain a competitive advantage; thus *Alnus incana* at upper elevations or *Populus angustifolia* or *Acer negundo* at lower elevations may eventually replace *Cornus stolonifera*. However, this process is likely of academic interest only, and is beyond a reasonable management planning period. The strong roots and stolons of *Cornus stolonifera* and most associated shrubs can tolerate relatively severe flooding, and provide an excellent measure of streambank stability. The dense shrub stratum usually prevents livestock access to the streambank. Small mammals and avian species may seek shelter and food within this c.t.

OTHER STUDIES.- Youngblood and others (1985) described two c.t.'s dominated by *Cornus stolonifera* from north of this study area. Differentiation was based on the presence of *Heraculeum lanatum*. Within northern Utah, stands fail to fit cleanly into either of the two types because of more variability in species composition of forbs, and less overall cover of forbs and graminoids. We have therefore not suggested any diagnostic undergrowth species. Within central Idaho, somewhat similar dommunities have been described by Tuhy and Jensen (1982) for the Salmon and Middle Fork Salmon Rivers.

POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA c.t.
(POFR/DECE)

DISTRIBUTION.- The POFR/DECE c.t. is incidental to our study area, and was found only within the Caribou and Portneuf Ranges of southern Idaho. It is more extensive within the Wyoming Range of western Wyoming. Our sample stands were above 1 860 m (6,100 feet) in elevation on a variety of sites, including wide meadows and large slumps or seeps. Adjacent

communities are often dominated by Salix wolfii or Salix boothii on more moist sites, or Artemisia tridentata ssp. vaseyana on drier sites.

VEGETATION.- Potentilla fruticosa dominates the low shrub overstory that may include small amounts of Artemisia cana. One sample stand contains equal amounts of P. fruticosa and Betula glandulosa. Stands lack the Salix wolfii component noted for the type in western Wyoming. Deschampsia cespitosa usually dominates the undergrowth. Other common graminoids include Carex praegracilis, Carex microptera, and Poa pratensis. Fragaria virginiana and Aster species are often conspicuous.

SOILS.- Soils are classified as either Typic or Cumulic Cryaquolls, and are similar to those described from western Wyoming (Youngblood and others 1985). Water table or distinct or prominent mottles are within 25 cm (10 inches) of the surface.

SUCCESSION/MANAGEMENT.- Our communities appear relatively stable. However, these sites may be vulnerable to grazing pressure because of the open shrub canopy and graminoid undergrowth. Grazing may lead to an increase in Poa pratensis and some forbs.

OTHER STUDIES.- The POFR/DECE c.t. was described for the Wyoming Range by Mutz and Graham (1982) and refined by Youngblood and others (1985) for eastern Idaho and western Wyoming. The c.t. as described here follows the concept established by the latter workers.

POTENTILLA FRUTICOSA/POA PRATENSIS c.t.

(POFR/POPR)

DISTRIBUTION.- The POFR/POPR c.t. is based upon limited data, and represents a minor type that also is known to occur north of our study area. It is usually found on sites similar to the closely related POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA c.t.

VEGETATION.- *Potentilla fruticosa* dominates a low shrub stratum. The undergrowth lacks *Deschampsia cespitosa* as the dominant graminoid, which distinguishes this c.t. and the POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA c.t. Instead, *Poa pratensis* or *Agropyron trachycaulum* may be conspicuous. *Polygonum bistortoides* and *Potentilla gracilis* may also be present.

SOILS.- Limited data suggest soils supporting this c.t. are similar to those of the POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA c.t.

SUGGESTION/MANAGEMENT.- POFR/POPR is apparently a disturbance-induced variant of the POTENTILLA FRUTICOSA/DESCHAMPSIA CESPITOSA c.t. Continual grazing pressure may have eliminated the non-rhizomatous grasses and encouraged *Poa pratensis* and forbs such as *Potentilla gracilis*, *Polygonum bistortoides*, and *Achillea millefolium*.

OTHER STUDIES.- This c.t. was tentatively proposed by Mutz and Queiroz (1983) in Idaho, and later refined for eastern Idaho and western Wyoming (Youngblood and others 1985). Somewhat similar communities apparently exist in central Idaho, and have been named based upon the presence of *Danthonia intermedia* (Tuhy and Jensen 1982).

ARTEMISIA CANA/POA PRATENSIS c.t.
(ARCA/POPR)

DISTRIBUTION.- The ARCA/POPR c.t. occurs occasionally in the northern portion of our study area, where it represents an extension of the type described for eastern Idaho and western Wyoming. It was also sampled near Strawberry Reservoir east of Provo, Utah. Throughout its distribution, it appears to be a minor riparian c.t. Sample stands are between 2 100 and 2 320 m (6,900 and 7,600 feet) in elevation, on gently sloping meadows and alluvial terraces well above perennial stream channels. Drier sites are

usually dominated by *Artemisia tridentata* ssp. *vaseyana*, while more moist extremes usually grade into *Potentilla fruticosa* stands.

VEGETATION.- *Artemisia cana* dominates the low shrub overstory. Undergrowth is characterized by high cover of *Poa pratensis* and may also include *Carex praegracilis* or *Deschampsia cespitosa*. Forb cover is variable.

SOILS.- Soils are thick and dark, and belong to the clayey particle-size class of Pachic or Aquic Cryoborolls or Cumulic Cryaquolls. Water tables are below the depth of the soil pits, although mottles indicated at least periodic fluctuation upward. These characteristics correspond to sites supporting the ARCA/POPR c.t. elsewhere.

SUCCESSION/MANAGEMENT.- Limited data from our study area and similar stands in Idaho and Wyoming suggest the ARCA/POPR c.t. may be disturbance-induced, with *Festuca idahoensis* or *Deschampsia cespitosa* (in our area) rather than *Poa pratensis* more common in the undergrowth of undisturbed communities. Most grazing systems in practice will likely maintain the presence of *P. pratensis*. Shrub densities may be controlled through herbicide application if timed to coincide with the active growing period. Application of fire will result in the rapid reestablishment of *Artemisia cana* through root sucker stimulation.

OTHER STUDIES.- The ARCA/POPR c.t. has been described by Youngblood and others (1985) as a minor type of eastern Idaho and western Wyoming.

SALIX GEYERIANA/CAREX ROSTRATA c.t.
(SAGE/CARO)

DISTRIBUTION.- A single stand in the Pebble Creek drainage of the Portneuf Range appears to represent the southern extent of the SAGE/CARO c.t., which occurs as a major riparian type within the Centennial and Big

Hole Mountains of eastern Idaho. Throughout its distribution, this type is usually found on broad benches or alluvial terraces below 2 130 m (7,000 feet) in elevation. Many stands appear to have developed in abandoned and sediment-filled beaver ponds.

VEGETATION.- Salix geyeriana dominates the normally open overstory. Other shrubs which may be present include Salix boothii, Salix drummondiana, Lonicera involucrata, or Ribes inerme. Carex rostrata characterizes the undergrowth. These wet sites may also support Carex aquatilis, Calamagrostis canadensis, Glyceria species, Equisetum arvense, and Mentha arvensis.

SOILS.- Our single site correlated well with known soil characteristics for previously described SAGE/CARO stands. In general, soils are fine-loamy to fine-clayey, deep, have thick accumulations of organic matter in upper horizons, are often wet at the surface, and have high available water capacity.

SUCCESSION/MANAGEMENT.- Limited data and observations suggest the SAGE/CARO c.t. is relatively stable. Other management implications, including certain wildlife relationships, are presented by Youngblood and others (1985).

OTHER STUDIES.- Muntz and Queiroz (1983) first described similar communities from the Centennial Mountains of Idaho, and noted their presence along the South Fork of the Salmon River in central Idaho. Youngblood and others (1985) provided a more detailed description based upon additional work in eastern Idaho. Our sample stand near Pocatello apparently represents the southern extent of the c.t.

SALIX GEYERIANA/MESIC FORB c.t.

(SAGE/MF)

DISTRIBUTION.- A single sample stand east of Malad City, Idaho appears to represent the southern extent of the SAGE/MF c.t., which occurs as a minor c.t. throughout eastern Idaho and western Wyoming.

VEGETATION.- Floristically, this c.t. resembles the SALIX BOOTHII/SMILACINA STELLATA c.t., with *Salix geyeriana* rather than *Salix boothii* or *Salix drummondiana* contributing more to the overstory canopy cover. The undergrowth is typically dominated by a variety of moist-site forbs, including *Smilacina stellata*, *Thalictrum occidentale*, *Valeriana occidentalis*, and *Potentilla gracilis*. The most common grasses are *Poa pratensis* and *Elymus glaucus*.

SOILS.- Soils are classified as Cumulic Cryaquolls, with loamy-skeletal particle-size class. Water table is at the surface.

SUCCESSION/MANAGEMENT.- Little is known about successional relationships for this c.t. Until further research refines management implications, we suggest management emphasis should be similar to that for our SALIX BOOTHII/SMILACINA STELLATA c.t.

OTHER STUDIES.- The SALIX GEYERIANA/MESIC FORB c.t. was first described by Youngblood and others (1985) based upon work throughout eastern Idaho and the Greys River drainage of western Wyoming. It does not apparently occur in northern Utah.

SALIX GEYERIANA/POA PRATENSIS c.t.

(SAGE/POPR)

DISTRIBUTION.- The SAGE/POPR c.t. is incidental to the northern portion of our study area, where it occurs sporadically within the Bear River and Caribou Ranges of Idaho. It is more common in central and

eastern Idaho. Stands are located on broad alluvial terraces between 1 890 and 2 070 m (6,200 and 6,800 feet) in elevation. Topography is generally smooth or gently undulating. Adjacent riparian communities are often dominated by graminoids such as *Deschampsia cespitosa*, *Poa pratensis*, or *Carex rostrata*. Drier sites usually have greater slopes, and support *Artemisia tridentata* ssp. *vaseyana*.

VEGETATION.- *Salix geyeriana* dominates the overstory. Small amounts of *Lonicera involucrata*, *Rosa woodsii*, or *Ribes* species may sometimes be present. *Poa pratensis* is normally abundant in the undergrowth. Occasionally, communities may contain significant amounts of *Deschampsia cespitosa*, *Juncus balticus*, or *Carex lanuginosa*. These may indicate broad ecotones with adjacent communities, or sites with less disturbance. Cover of forbs is variable; *Geum macrophyllum* has high constancy, but low cover.

SOILS.- Most soils are classified as Cumulic Cryaquolls with clayey particle-size class. Mottling within the top 30 cm (12 inches) is common. Available water capacity is high.

SUCCESSION/MANAGEMENT.- Although this type appears to represent stable conditions, it probably is the result of at least minor surface disturbance within our SALIX GEYERIANA/MESIC FORB c.t. or some unclassified situation. The presence of *Deschampsia cespitosa* may indicate more natural conditions. However, reduction in grazing pressures will not likely result in a significant change in current species composition. The characteristically fine textured surface horizons are easily eroded if ground cover is removed or trampled under excessive grazing pressure. We suggest management be in commensuration with SALIX BOOTHII/SMILACINA STELLATA until more detailed studies indicate otherwise.

OTHER STUDIES.- The SAGE/POPR c.t. was first described by Youngblood and others (1985) from eastern Idaho.

SALIX BOOTHII/CAREX ROSTRATA c.t.
(SABO/CARO)

DISTRIBUTION.- SABO/CARO represents a major riparian c.t. within the Bear River and Caribou Range of our study area. It also occurs sporadically within the extreme southern Wasatch and Uinta Ranges near Strawberry Reservoir. North of our study area, the type extends throughout western Wyoming, eastern Idaho, and into central Idaho. Stands are found on wet alluvial terraces and gently sloping seeps between 1 800 and 2 440 m (5,900 and 8,000 feet) in elevation. Adjacent riparian communities are often dominated by _Carex rostrata_, _Carex aquatilis_ or _Deschampsia cespitosa_. Drier, non-riparian communities may include conifers such as _Abies lasiocarpa_ or _Picea engelmannii_ on mesic toeslopes.

VEGETATION.- The type is characterized by a relatively dense canopy of _Salix boothii_. _Salix drummondiana_ may also be present, and was the dominant shrub in several sample stands. Other shrubs occasionally found near the base of _Salix_ clumps include _Lonicera involucrata_ and _Ribes_ species. _Salix boothii_ and sometimes _Salix drummondiana_ are often exhibiting an apparent response to environmental stress within this c.t.; these _Salix_ species are only 1 m (39 inches) tall on especially wet sites. On somewhat drier sites, where oxygen may be more readily available within the soil profile, height of _S. boothii_ and _S. drummondiana_ may exceed 2 m (6.5 feet). The undergrowth typically is a dense sward of _Carex rostrata_ or _Carex aquatilis_. We also include in this c.t. stands with rather

depauperate undergrowths, where either *C. rostrata* or *C. aquatilis* contribute the most to total undergrowth cover.

SOILS.- Most soils supporting this c.t. within our study area are classified as Typic, Cumulic, or Histic Cryaquolls (appendix C). Particle-size classes are variable, although clayey and fine-loamy are the most commonly encountered. Water tables range from the surface to more than 1 m (39 inches). Ground surfaces may be partially covered by mats of moss or litter. Available water capacity is generally high.

SUCCESSION/MANAGEMENT.- The SABO/CARO c.t. is highly variable in successional status. Some of our sample stands have formed on relatively young soils with little or no development; herbaceous layers within the undergrowth are depauperate, suggesting the continuation of deposition from fluvial action. Other sites have thick, well-developed mollic epipedons indicative of stable conditions and mature soils. These commonly support denser undergrowths. Several successional trends are possible. This SABO/CARO c.t. could develop following a gradual invasion by shrubs in communities belonging to the CAREX ROSTRATA or CAREX AQUATILIS c.t., especially as beaver ponds become filled with sediment and the margins become somewhat drier. Another possible successional trend is the establishment of *Salix boothii*, *Salix drummondiana*, and *Carex rostrata*, all rather opportunistic species, on sites receiving periodic deposition of fine silts following overland flows.

OTHER STUDIES.- The SABO/CARO c.t. was first described from the Greys River drainage in Wyoming by Norton and others (1981). The concept was later refined by Youngblood and others (1985) for eastern Idaho and western Wyoming, and serves as the basis for this treatment for northern Utah. Tuhy and Jensen (1982) included communities fitting this description in their SALIX/CAREX ROSTRATA c.t. for central Idaho.

SALIX BOOTHII/CAREX NEBRASCENSIS c.t.

(SABO/CANE)

DISTRIBUTION.- A single sample stand in the Malad Range of southern Idaho is used to extend the distribution of the SABO/CANE c.t. into southern Idaho. It occurs infrequently within the Centennial mountains. The stand, at 1 920 m (6,300 feet) in elevation, occupied a broad meadow.

VEGETATION.- *Salix boothii* creates a dense overstory stratum. *Carex nebrascensis* and *Glyceria striata* are conspicuous in the undergrowth.

SOILS.- Soils at our site are classified as Histic Cryaquolls with family particle-size class fine clayey. Water table is at the surface.

SUCCESSION/MANAGEMENT.- These sites may be sought by cattle because *Carex nebrascensis* is relatively palatable. The fine textured soils may quickly erode if cover is removed through grazing or trampling.

OTHER STUDIES.- The SABO/CANE was originally described from limited observations in the Centennial Mountains of Idaho (Youngblood and others 1985). Our sample stand near Malad is similar in floristic composition, soil characteristics, and topographic features.

SALIX BOOTHII/CALAMAGROSTIC CANADENSIS c.t.

(SABO/CACA)

DISTRIBUTION.- The SABO/CACA c.t. is incidental to the northern portion of our study area. It occurs more frequently in eastern and central Idaho. The type is found on alluvial terraces adjacent to small streams, has undulating surfaces, and is between 1 890 and 2 040 m (6,200 and 6,700 feet) in elevation.

VEGETATION.- A dense shrub stratum dominated by *Salix boothii* characterizes the overstory. Unlike most other c.t.'s within our study area, *Salix drummondiana* apparently is not as common. Small amounts of

Salix geyeriana may be found, along with *Lonicera involucrata* and *Ribes* species. The undergrowth is dominated by *Calamagrostis canadensis*. Stands differ slightly from those north of our study area by containing a conspicuous forb component which includes *Aconitum columbianum*, *Smilacina stellata*, *Angelica arguta*, and *Aster* species. The presence of *Calamagrostis canadensis* is diagnostic and indicates this SABO/CACA c.t. rather than the SALIX BOOTHII/SMILACINA STELLATA c.t.

SOILS.- Soils are usually Typic or Cumulic Cryaquolls. Family particle-size classes for fine earth fraction is coarse-loamy, fine-loamy, or clayey; at least 35 percent coarse fragments are sometimes present in horizons below 34 cm (13 inches) in depth. Available water capacity is usually high.

SUCCESSION/MANAGEMENT.- Little is known about successional trends for this c.t. Our assumption, based upon soil characteristics, is that these stands have been in place for considerable time. Because of the fine textured soils, severe erosion could result from prolonged grazing or trampling by livestock. We suggest, until further management implications are developed, these communities be managed similar to those belonging to our SALIX BOOTHII/CAREX ROSTRATA c.t.

OTHER STUDIES.- The SABO/CACA c.t. was originally developed from work in central Idaho (Tuhy and Jensen 1982), and then later refined for eastern Idaho and western Wyoming (Youngblood and others 1985). Our treatment for northern Utah maintains the concept of the latter workers, and extending the distribution southwards.

SALIX BOOTHII/EQUISETUM ARVENSE c.t.

(SABO/EQAR)

DISTRIBUTION.- One sample stand near Tony Grove in the Logan River drainage of the Bear River Range apparently represents an outlier of the SABO/EQAR c.t., described from the Greys River drainage of western Wyoming.

VEGETATION.- *Salix boothii* dominates the overstory. *Equisetum arvense* and *Poa palustris* are conspicuous in the undergrowth.

SOILS.- There apparently is wide variability in soils within this c.t. Our site belongs to the Typic Cryaquolls.

OTHER STUDIES.- The SABO/EQAR c.t. was first described from the Greys River drainage in western Wyoming and the Centennial Mountains of northeastern Idaho (Youngblood and others 1985). These workers present in more detail the common floristic, soils, and management features of the type.

SALIX BOOTHII/SMILACINA STELLATA c.t.

(SABO/SMST)

DISTRIBUTION.- SABO/SMST is a major c.t. throughout most of the study area. It also extends north and east into western Wyoming. It commonly occurs on alluvial terraces adjacent to streams; occasionally the type may also occur in moist meadows or seeps. Slopes are typically gentle with variable microtopography. Within our study area, the type was sampled between 1 620 and 2 800 m (5,300 and 9,200 feet) in elevation. However, it averages 2 040 m (6,700 feet) in elevation in the Caribou Range, and 2 240 m (7,340 feet) at the southern end of the Wasatch Range near Strawberry Reservoir. Adjacent riparian communities are diverse, and may be dominated by various herbaceous species or *Populus angustifolia*. Upland communities

are often conifer stands containing Pinus contorta and Abies lasiocarpa, or non-forest stands of Artemisia tridentata ssp. vaseyana.

VEGETATION.- A dense, tall shrub stratum (our stands average over 2.5 m (8 feet) and 85 percent canopy cover) composed of Salix boothii and Salix drummondiana forms the overstory of this c.t. A low shrub layer of Lonicera involucrata and Ribes species is also usually present. The undergrowth is conspicuously forby, and is composed of species such as Heracleum lanatum, Mertensia ciliata, Smilacina stellata, and Thalictrum fendleri. Geranium richardsonii, Geum macrophyllum, and Senecio serra are often present in small amounts. Circium species and Urtica dioica may be abundant, and usually indicate previous site disturbance. Poa pratensis and Agrostis stolonifera are the most common grasses. There is little overall difference in overall species composition between our sample stands in northern Utah and sample stands from eastern Idaho and western Wyoming. Minor inequalities include an increase in constancy and average cover for Lonicera involucrata and Mertensia ciliata, an increase in average cover of Smilacina stellata, and a decrease in the abundance of Aster foliaceus and Fragaria virginiana.

SOILS.- Most soils supporting this c.t. are classified as Typic or Cummulic Cryaquolls (appendix C). Family particle-size classes is highly variable, with a corresponding range in available water capacity from low to high. Water tables range from 25 cm (10 inches) to more than 1 m (39 inches) in depth. All sampled soils, however, have distinct or prominent mottles within the upper 50 cm (20 inches). Limited observations suggest that Smilacina stellata may be more common when water tables fluctuate up to about 30 cm (12 inches) from the surface, while Mertensia ciliata and Heracleum lanatum may either require or tolerate at least periodic ground water nearer to the surface.

SUCCESSION/MANAGEMENT.- Most stands appear relatively stable. Many have shrub densities which prevent or discourage human or livestock disturbance. A few stands, especially those adjacent to existing or remnant beaver ponds, have small channels and corridors that may encourage seasonal flooding. Many avian species appear to utilize these communities. Stands belonging to this c.t. in Idaho apparently are habitat for warbling vereos, black-headed grosbeaks, white-crowned sparrows, calliope hummingbirds, and Wilson's warblers (Douglas and Ratti 1984).

OTHER STUDIES.- Youngblood and others (1985) first described the SABO/SMST for eastern Idaho and western Wyoming. Our treatment for northern Utah maintains the concept of the type, and extends its distribution southward along the Bear River and Wasatch Ranges.

SALIX BOOTHII/POA PRATENSIS c.t.

(SABO/POPR)

DISTRIBUTION.- SABO/POPR is a major c.t., with sporatic occurrence throughout much of the study area. It also extended northward along the Idaho-Wyoming border. It usually occurs on alluvial terraces with gentle slopes and smooth or slightly undulating surfaces. Stands range in elevation from near 1 830 m (6,000 feet) within the Caribou Range to over 2 440 m (8,000 feet) near the southern edge of the Wasatch Range. Adjacent riparian c.t.'s often include *Poa pratensis* and may have overstories dominated by *Artemisia cana*. Non-riparian communities usually include *Artemisia tridentata* ssp. *vaseyana*, *Populus tremuloides* or *Abies lasiocarpa*.

VEGETATION.- *Salix boothii* or *Salix drummondiana*, or sometimes a combination fo the two, form a tall shrub stratum which usually exceeds 2 m (6.5 feet) in height. *Salix exigua* may also be present. Overall density

of *Salix* species is somewhat less than other c.t.'s dominated by *S. boothii* or *S. drummondiana*; the SABO/POPR shrub canopy is often open and clumpy and may resemble conditions within the SALIX GEYERIANA/POA PRATENSIS c.t. Low shrubs that may be present in small amounts include *Lonicera involucrata*, *Ribes* species, or *Rosa woodsii*. *Poa pratensis* is usually conspicuous in the undergrowth, but may be overtopped by *Cirsium* species, *Urtica dioica*, or *Fragaria virginiana*.

SOILS.- Most soils are classified as Cumulic Cryoborolls, Haplaquolls, or Cryaquolls (appendix C). Fine earth fraction within the control section is variable, and about half of the sites may contain at least 35 percent rock fragments. Available water capacity ranges from low to high.

SUCCESSION/MANAGEMENT.- Successional relationships for the SABO/POPR c.t. are unclear. A few stands appear similar in site characteristics to communities in the SALIX BOOTHII/SMILACINA STELLATA c.t. These stands have received heavy disturbance from livestock because of the open, clumpy shrub overstory and close proximity to perennial streams. Presumably, forb cover, characteristic of our SALIX BOOTHII/SMILACINA STELLATA c.t., has been reduced through disturbance, and grazing-tolerant species, such as *Poa pratensis*, have increased. Elsewhere, communities belonging to this SABO/POPR c.t. appear too xeric to support the mesic forbs common to the SALIX BOOTHII/SMILACINA STELLATA c.t., regardless of surface disturbance. Throughout the distribution of this c.t., soil characteristics suggest that ground surfaces may be easily eroded if cover is lost, and streambank stability may be a management concern.

OTHER STUDIES.- The SABO/POPR c.t. was first described by Norton and others (1981) from the Greys River drainage in Wyoming, and then refined by Youngblood and others (1985) for eastern Idaho and western Wyoming. Our

treatment for Utah maintains the concept of the latter workers and extends the distribution southward.

SALIX WOLFII/CAREX AQUATILIS c.t.
(SAWO/CAAQ)

DISTRIBUTION.- A single stand near Tony Grove Lake in the Bear River Range serves to extend the distribution of the SAWO/CAAQ c.t. from central and eastern Idaho and western Wyoming into northern Utah. This sample stand is at 2 450 m (8040 feet) in elevation on a wet seep surrounded by *Abies lasiocarpa* forests and a graminoid community belonging to our CAREX AQUATILIS c.t.

VEGETATION.- *Salix wolfii* and *Carex aquatilis* are dominant species. The stand has a relatively rich forb component that includes *Aconitum columbianum* and *Geranium richardsonii*.

SOILS.- Soils are classified as Typic Borofibrists.

OTHER STUDIES.- The SAWO/CAAQ c.t. is described for eastern Idaho and western Wyoming, where it is a major riparian c.t. within the Greys River drainage and also occurs sporadically within the Caribou Range (Youngblood and others 1985). The stand in northern Utah is consistent in floristic composition and site characteristics of soils and topographic features.

SALIX WOLFII/DESCHAMPSIA CESPITOSA c.t.
(SAWO/DECE)

DISTRIBUTION.- A single sample stand in the northern portion of the Bear River Range apparently represents an extension southward of the SAWO/DECE c.t.

VEGETATION.- A dense stand of *Salix wolfii*, with small amounts of *Potentilla fruticosa*, creates the shrub overstory. A conspicuous graminoid

layer contains Deschampsia cespitosa, Juncus balticus and Carex microptera. Galium boreala is the most abundant forb.

SOILS.- Soils are classified as Typic Cryaquolls, with fine-loamy over clayey-skeletal particle-size class.

SUCCESSION/MANAGEMENT.- Limited data prevent the development of clear successional hypotheses for this c.t.

OTHER STUDIES.- Our stand appears similar to conditions in the Greys River drainage of western Wyoming, where the type is considered a minor riparian c.t. (Youngblood and others 1985).

SALIX WOLFII/MESIC FORB c.t.
(SAWO/MF)

DISTRIBUTION.- Two stands in the Idaho portion of the Bear River Range represent a southern extension of the SAWO/MF c.t. Although incidental in our study area, it is a major c.t. of the Greys River drainage in western Wyoming. It is found near small streams at mid to upper elevations.

VEGETATION.- A dense stand of Salix wolfii creates the overstory. Graminoids are inconspicuous. The undergrowth is clearly dominated by several mesic-site forbs, including Fragaria virginiana, Mertensia ciliata, Smilacina stellata, and Aster foliaceus.

SOILS.- Soils at the two sample stands are classified as Cumulic Cryaquolls. Fine earth fraction within the central section is fine-loamy, although one site contains at least 35 percent coarse fragments. Water tables are at or below 40 cm (16 inches).

OTHER STUDIES.- The SAWO/MF c.t. is a major c.t. in western Wyoming (Youngblood and others 1985). Throughout its distribution, including the stands in the Bear River Range, the type appears relatively stable with little indication of retrogression or progression.

SALIX EXIGUA/EQUISETUM ARVENSE c.t.

(SAEX/EQAR)

DISTRIBUTION.- The SAEX/EQAR c.t. is a minor c.t. throughout the mid to lower elevational portion of our study area. Slopes are usually gentle and surface topography is smooth to moderately undulating. Adjacent communities are diverse, and may be dominated by *Abies lasiocarpa* or upland *Artemisia* types.

VEGETATION.- The shrub canopy is dominated by a dense layer of *Salix exigua* but may also include *Rosa woodsii*, *Lonicera involucrata*, several species of *Ribes* and small amounts of *Salix boothii*. A diversity of forbs and graminoids dominate the understory with either *Equisetum arvense* or *Calamagrostis canadensis* prominent.

SOILS.- Soils are generally fine textured with shallow water tables and moderate available water capacities.

SUCCESSION/MANAGEMENT.- *Salix exigua* is a pioneering species commonly found along irrigation ditches, cutbanks, and wet areas adjacent to roads. It has a capability to rapidly colonize and spread on disturbed sites and can be useful in streambank stabilization and revegetation projects at the mid to lower elevations. Once *Salix exigua* has stabilized the soils, other shrub and herbaceous species may become established.

Equisetum arvense likewise is common throughout western North America. It receives little grazing impact and is tenacious after establishment. Its numerous fibrous roots and strong rhizomes allow it to be very useful in stabilizing stream banks.

Limited information suggests this type may be seral to the SALIX BOOTHII/EQUISETUM ARVENSE c.t.

OTHER STUDIES.- This type has been previously described by Youngblood and others (1985) in Wyoming and eastern Idaho. Since both Salix exigua and Equisetum arvense are widely distributed species, this type will likely be found in other adjacent states as more riparian areas are classified.

SALIX EXIGUA/POA PRATENSIS c.t.

(SAEX/POPR)

DISTRIBUTION.- The SAEX/POPR c.t. is a minor type that occurs infrequently throughout the study area. It is found more commonly in Wyoming, Idaho, and Oregon. It occurs on gently sloping alluvial benches adjacent to major streams and rivers. Elevations are usually below 1 830 m (6,000 feet).

VEGETATION.- Salix exigua creates a dense, almost impenetrable shrub canopy that may reach 3 m (10 feet) in height. Rosa woodsii may also be present, sometimes with high coverage. Other shrubs, if present, are accidentals, or represent ecotones with slightly drier environments. The undergrowth is diverse, and may range from almost lush to depauperate. Graminoids such as Poa pratensis, Agrostis stolonifera, and Elymus glaucus are usually present. Common forbs include Circium and Epilobium species, Geum macrophyllum, and sometimes Heracleum lanatum.

SOILS.- Soils generally are coarse textured and contain more than 35 percent rock fragments (appendix C). Mollic epipedons are usually present, and common suborders include Aquolls and Borolls. Water tables range from the surface to greater than 1 m (39 inches) in depth. Most sites are immediately adjacent to flowing water. Fluvial scouring and annual deposition apparently are common events within this type, and may result in areas of bare soil and rock. This provides abundant sedbeds for establishment of annuals such as Epilobium, Medicago, Trifolium or Poa

species. Available water capacity varies from low to high depending upon texture and coarse fragment content.

SUCCESSION/MANAGEMENT.- The SAEX/POPR c.t. may be frequently influenced by the annual dynamics of the stream or river. Under these conditions, Salix exigua either provides a pioneering function in streambank stabilization through early colonization, or may represent an important stage in secondary succession, as sediments and organic material are trapped by residual stems and later incorporated into the soil profile. In some situations, the presence of Salix exigua, and the subsequent lessening of fluvial disturbances, may be necessary for the gradual invasion of other shrubs such as Cornus stolonifera or Alnus incana. A few other c.t.'s contain significant amounts of Salix exigua, such as ALNUS INCANA/RIBES HUDSONIANUM, CORNUS STOLONIFERA, and POPULUS ANGUSTIFOLIA/CORNUS STOLONIFERA, and may have developed from this SAEX/POPR c.t. The ability to colonize disturbed sites suggests the practicality of using Salix exigua in riparian revegetation projects.

OTHER STUDIES.- The SAEX/POPR c.t. is more widespread in eastern Idaho and western Wyoming (Youngblood and others 1985). Tuhy and Jensen (1982) noted similar communities in central Idaho, and Padgett (1981) described Salix exigua situations in eastern Oregon.

SALIX LUTEA c.t.
(SALU)

DISTRIBUTION.- SALU is a minor riparian c.t. that occurs sporadically throughout the study area at mid to low elevations. It has also been noted in the Centennial Mountains of Idaho. Typical sites are on gentle alluvial terraces or streambanks. Adjacent communities often include Salix boothii,

or non-riparian stands of Populus tremuloides, Prunus virginiana, Artemisis tridentata ssp. vaseyana, or Symphoricarpos oreophilus.

VEGETATION.- The relatively tall, often almost tree-like Salix lutea dominates a diverse overstory. Sometimes Salix lasiandra is more common. Betula occidentalis or Populus angustifolia may be present as accidentals. Alnus incana, Cornus stolonifera, Ribes species, Lunicera involucrata, and other Salix species may be present in small amounts. The undergrowth is variable. Although Equisetum arvense is present in most sampled stands, we resisted naming a diagnostic undergrowth species until additional communities are examined. Other species in the undergrowth, including Agrostis stolonifera, Poa pratensis, Cirsium species, Urtica dioica, and Cynoglossum officinale, suggest recent disturbance.

SOILS.- Limited data suggest few discernable relationships. Several family particle-size classes are represented, ranging from sandy-skeletal to clayey (appendix C). Water tables are relatively deep, and available water capacity is low.

SUCCESSION/MANAGEMENT.- Insufficient data exists to suggest clear successional relationships. We assume Salix lutea is relatively long-lived, based upon growth characteristics. Many communities have had various degrees of disturbance, including grazing and trampling by livestock, and overland flow and fluvial deposition. Salix lutea may be used by avian species for nesting, because of its growth form.

OTHER STUDIES.- The SALU c.t. occurs as a minor type in the eastern Centennial Mountains and northern Caribou Range of Idaho (Youngblood and others 1935). Our treatment for northern Utah maintains previous concepts and extends the distribution southward.

CAREX MICROPTERA c.t.

(CAMI)

DISTRIBUTION.- The CAMI c.t. appears to be incidental to our study area, where it occurs within the Bear River and Caribou Ranges in Idaho. The type extends northward along the Idaho-Wyoming border, where it is more common. It occurs on small alluvial terraces, old beaver ponds, and wet slumps or seeps. Elevations are generally below 2 130 m (7,000 feet).

VEGETATION.- *Carex microptera* dominates the community. Other graminoids that may be present in lesser amounts include *Carex rostrata*, *Deschampsia cespitosa*, *Hordeum brachyantherum* and *Poa pratensis*. Cover of forbs or shrubs is usually negligible.

SOILS.- Fine textured soils with clayey upper horizons are characteristic of this c.t. Soils are classified predominately as Cumulic or Argic Cryaquolls. Water tables are within 60 cm (24 inches) of the surface. Available water capacity is high.

SUCCESSION/MANAGEMENT.- Little is known about successional trends involving the CAMI c.t. It apparently is present in areas that have had various amounts of grazing disturbance. Until more type-specific management prescriptions are developed, the CAMI c.t. may be considered similar to the DESCHAMPSIA CESPITOSA c.t.

OTHER STUDIES.- The CAMI c.t. follows the concept used for eastern Idaho and western Wyoming by Youngblood and others (1985).

CAREX ROSTRATA c.t.

(CARO)

DISTRIBUTION.- CARO is a major type within the study area, is known to occur in all portions except the western-most mountain ranges surrounding Malad and Pocatello, ID. Although sampled within the Uinta Mountains, it

occurs more frequently in the Bear River Range near the Idaho-Utah border. It also is known from Colorado, Wyoming, central Idaho and Oregon. Typical sites are level benches or flats near small streams, perennial seeps, and former beaver ponds that have filled with sediment. Elevations range from 1 580 to 2 150 m (5,200 to 7,050 feet). Surface microtopography may be smooth, or more often, hummocky and mounded. This relief often results from a buildup of Carex sod and downcutting of small channels by overland flow during spring runoff. Some may also be remnant channels used by beaver when water tables were higher.

The CARO c.t. represents one of the wettest riparian situations; it often borders small meandering streams or open lacustrine systems such as beaver ponds or oxbow lakes. It may occasionally grade into wetland communities dominated by species such as Eleocharis palustris. Adjacent and drier communities are diverse. With drastically contrasting relief and water table, the driest riparian c.t.'s dominated by Artemisia cana or Potentilla fruticosa may abut. Non-riparian communities, composed of Artemisia tridentata ssp. vaseyana and Elymus cinereus are also proximate. More often, adjacent drier sites will support Salix boothii, Salix drummondiana, Carex aquatilis, Carex microptera, Carex nebrascensis, Deschampsis cespitosa, or Poa pratensis.

VEGETATION.- Carex rostrata is the dominant species and occurs as a dense sward. Species diversity is very low, with most associated species appearing only as scattered individuals. Carex rebrascensis or Carex aquatilis usually indicate somewhat drier extremes, while Mimulus guttatus, Potamogeton gramineus, and various ground mosses are common on the more moist extremes. Other species occurring include Glyceria striata, Poa pratensis, Geum macrophyllum, and Equisetum arvense. Shrubs are noticeably absent or accidental.

SOILS.- The CARO c.t. represents communities occurring on high water tables. Soils are classified as various Cryaquolls, Histosols, or Hemic Cryaquepts (appendix C). Family particle-size classes for mineral substrates are fine-loamy or clayey; these fine textured soils are often gleyed. Available water capacity is moderate to high.

SUCCESSION/MANAGEMENT.- Most CARO communities appear relatively stable. Few species can tolerate the persistent high water tables and competition from Carex rostrata. Once established, C. rostrata should retain dominance until site factors change significantly. The dense sod formed by numerous coarse, creeping rhizomes is resistant to low energy overland flow of floodwater. Only major changes in fluvial patterns that affect water table depths or cause stream flooding to become more abrasive appear to influence community dynamics. Communities may sometimes become more lacustrine through reestablishment of dams, or more typically, become drier and support addition graminoid and shrub species through invasion. If Salix boothii or Salix drummondiana become established as water tables slowly drop, the resulting community will belong to the SALIX BOOTHII/CAREX ROSTRATA c.t.

Both cattle and horses may occasionally utilize the forage within this c.t. Production, almost entirely graminoids, is considerable, although the coarse and tough Carex rostrata may be of relatively low palatability. Moose and elk will also graze these sites. Although fire may remove much of the organic accumulation, little change in species composition can be expected.

OTHER STUDIES.- The CARO c.t. has been described for eastern Idaho and western Wyoming by Youngblood and others (1985). Our treatment in Utah represents an extension of previous concepts. Somewhat similar situations exist in Colorado (Hess and Wasser 1982; Komarkova 1982) although these

authors also include Carex aquatilis in the association. Other workers have noted the CARO c.t. in central Utah (Kerr and Henderson 1979), central Idaho (Schlatterer 1972; Tuhy and Jensen 1982), and eastern Oregon (Sayer 1979; Padgett 1981).

CAREX AQUATILIS c.t.
(CAAQ)

DISTRIBUTION.- The CAAQ c.t. is a minor type scattered throughout the study area. It also occurs in Idaho and Wyoming. It typically is found on smooth or slightly concave meadows within valley bottoms, or broad flat benches near small streams. Elevations range from 2 010 to 2 930 m (6,600 to 9,600 feet). It may grade into the CAREX ROSTRATA c.t. with a slight increase in water table. Drier sites are diverse, and often support Deschampsia cespitosa at higher elevation, and Carex nebrascensis at lower elevations. Like the CAREX ROSTRATA c.t., CAAQ may also be found on silted-in beaver ponds, depressions left by migrating stream channels, or narrow bands close to small streams.

VEGETATION.- Carex aquatilis is the dominant species, and occurs as a dense sward. Other graminoids that may be present include small amounts of Carex rostrata, Deschampsia cespitosa, or Carex microptera. Shrubs and forbs are usually negligible. A dense carpet of moss may intermix with the Carex aquatilis.

SOILS.- Limited data prevent the establishment of clear relationships. Some soils are classified as Typic Cryaquents or Typic Cryaquolls, with either coarse loamy or fine clayey over clayey skeletal particle-size classes. Other soils have a thick organic accumulation, and belong to Histic Cryaquolls or Typic Borofibrists. Water tables are generally near the surface, and available water capacity for mineral soils is moderate to high.

SUCCESSION/MANAGEMENT.- Little is known about successional trends for this c.t. <u>Carex aquatilis</u> is highly palatable to cattle and horses and may provide valuable forage. Annual production is likely similar to the CAREX ROSTRATA c.t. The difference in palatability between <u>Carex aquatilis</u> and <u>Carex rostrata</u> is the primary basis for not grouping these species into one c.t.

OTHER STUDIES.- The CAAQ c.t. was first described by Matz and Queiroz (1983) for the Centennial Mountains of Idaho. The type was described in more detail based on work in eastern Idaho and western Wyoming (Youngblood and others 1985). Our treatment for northern Utah maintains previous concepts and extends the distribution southward.

CAREX NEBRASCENSIS c.t.

(CANE)

DISTRIBUTION.- The CANE c.t. is a major type that is distributed throughout much of the study area. It occurs most frequently in the Bear River and Caribou Ranges, and is also known from eastern Idaho and western Wyoming. Our stands occur on gentle to moderate slopes with smooth or undulating surface topography. Typical sites are broad meadows or narrow stringers along stream terraces which receive lateral subirrigation rather than fluvial flooding. Elevations are generally between 1 830 and 2 290 m (6,000 and 7,500 feet) and are apparently not affected by latitude. Boundaries with adjacent riparian communities are usually abrupt. More moist sites may support <u>Carex rostrata</u> while drier communities are described by our JUNCUS BALTICUS, ARTEMISIA CANA/POA PRATENSIS, or POA PRATENSIS c.t.

VEGETATION.- <u>Carex nebrascensis</u> dominates a typically dense graminoid layer that may include <u>Deschampsia cespitosa</u>, <u>Juncus balticus</u>, or <u>Poa</u>

pratensis. *Mimulus guttatus* and small *Epilobium* species are occasionally present, but rarely abundant.

SOILS.- Most soils are classified as Cumulic Cryaquolls, or have thickened organic surface horizons (appendix C). Particle-size classes for non-organic soils are predominately clayey. Mottling is often present near the surface and extends throughout the profile. Water table is also near the surface. Available water capacity is generally high.

SUCCESSION/MANAGEMENT.- The CANE c.t. appears to be intermediate in moisture and succession between our CAREX ROSTRATA and DESCHAMPSIA CESPITOSA c.t.'s. Because of the strong rhizomatous reproduction of *Carex nebrascensis*, these communities are often relatively stable. In some cases, they may have developed following grazing, and the reduction of non-rhizomatous species such as *Deschampsia cespitosa*. *Carex nebrascensis* is a valuable forage species for cattle and horses (Lewis 1958; Hermann 1970).

Our general observations are that these communities are usually highly productive, and many may have been heavily grazed in the past. Proper management should involve restricting grazing to a level that maintains full ground cover and prevents erosion.

OTHER STUDIES.- The CANE c.t. was first described by Mutz and Queiroz (1983) from the Centennial Mountains of Idaho. The type was later applied to communities throughout eastern Idaho and western Wyoming (Youngblood and others 1985). Our treatment for northern Utah maintains previous concepts, and extends the distribution southward.

JUNCUS BALTICUS c.t.

(JUBA)

DISTRIBUTION.- The JUBA c.t. is a minor type within our study area. It is found more frequently along the eastern Idaho border and within

central Idaho. The type occurs within southern Idaho along the Caribou and Bear River Ranges. Typically, these communities are on alluvial terraces and seeps below 1 980 m (6,500 feet). The type is often found as small inclusions or patches, representing moist depressions within a larger and usually drier matrix represented by our POA PRATENSIS or SALIX EXIGUA/POA PRATENSIS c.t. The JUBA c.t. may also be in close proximity to stands dominated by *Salix geyeriana*.

VEGETATION.- *Juncus balticus* dominates a dense graminoid layer that may also include *Poa pratensis*. One stand contained relatively high coverage of *Carex nebrascensis*. Forbs are usually diverse, but are not consistent.

SOILS.- Limited data indicate that soils are typically wet early in the growing season with water tables near the surface. These sites may gradually become drier. Soils are classified as Typic Cryaquolls and Terric Borohemists, with fine-loamy or clayey particle-size classes.

SUCCESSION/MANAGEMENT.- *Juncus balticus* is a strongly rhizomatous species that is often considered an increaser because of its tolerance of grazing. In some cases, *J. balticus* may have replaced other riparian graminoids as a result of heavy grazing pressure. When young, *J. balticus* is tender and may provide valuable feed for livestock. It also shows a potential for use in streambank stabilization projects.

OTHER STUDIES.- The JUBA c.t. was first described from the Wyoming Range (Mutz and Graham 1982) and then shown to occur throughout eastern Idaho and western Wyoming (Youngblood and others 1985). Similar communities exist in central Idaho (Tuhy and Jensen 1982) and eastern Oregon (Padgett 1981).

DESCHAMPSIA CESPITOSA c.t.
(DECE)

DISTRIBUTION.- The DECE c.t. is a minor riparian type within our study area and was sampled infrequently within the Caribou and Bear River Ranges in southern Idaho. It occurs more frequently in Wyoming, central Idaho, and Montana. Reconnaissance data indicate it also occurs within the higher elevations of the Uinta Mountains in northeastern Utah.

VEGETATION.- *Deschampsia cespitosa* dominates a dense graminoid layer. Other graminoids, such as *Carex microptera*, *Poa pratensis*, or *Carex nebrascensis* may be present in lesser amounts. Forbs are usually inconspicuous, although *Ranunculus alismaefolius* and *Polygonum bistortoides* may be present in several stands.

SOILS.- Soils usually have an aquic moisture regime with water tables between 22 and 33 cm (8 and 13 inches). Family particle-size classes are clayey. Available water capacity is high.

SUCCESSION/MANAGEMENT.- *Deschampsia cespitosa* is an important range species for livestock throughout its distribution. Density of *D. cespitosa* may be greatly reduced through continued grazing. Some of our POA PRATENSIS c.t. communities may have contained more *D. cespitosa* at one time. *Deschampsia cespitosa* shows little potential for use in streambank stabilization because of its thin, fibrous root structure.

OTHER STUDIES.- Communities in southern Idaho appear to represent a southern extension of the type as described for eastern Idaho and western Wyoming (Youngblood and others 1985). Tuhy and Jensen (1982) described a closely related type in central Idaho, and Mueggler and Stewart (1980) have

classified sites supporting *Deschampsia cespitosa* and various *Carex* species.

POA PRATENSIS c.t.
(POPR)

DISTRIBUTION.- The POPR c.t. is a minor type occuring in the northern portion of the study area. It also extends into Idaho, western Wyoming, and Oregon. Typical sites are on alluvial terraces with gentle slopes and smooth microtopography. Elevations are usually below 1 830 m (6,000 feet). Adjacent riparian communities may be dominated by a variety of species, including *Alnus incana*, *Salix boothii*, or *Carex nebrascensis*.

VEGETATION.- *Poa pratensis* usually has high cover. Other graminoids such as *Agrostis stolonifera* may sometimes codominate.

SOILS.- Soils are variable, but typically have thick mollic epipedons and become dry near the surface early in the growing season. Available water capacity is moderate to high.

SUCCESSION/MANAGEMENT.- The POPR c.t. apparently represents disturbed conditions, and may be related to the DESCHAMPSIA CESPITOSA or CAREX MICROPTERA c.t. The shallow rhizomatous rooting of *Poa pratensis* suggests a potential for severe erosion if ground cover is lost. Streambank stability is low.

OTHER STUDIES.- Communities dominated by *Poa pratensis* have been described for Oregon (Franklin and Dryness 1973; Hall 1973; Padgett 1981) and Idaho (Tuhy and Jensen 1982; Youngblood and others 1985).

MERTENSIA CILIATA c.t.

(MECI)

DISTRIBUTION.- MECI is a minor c.t. of upper elevations in the southeastern Idaho portion of the study area. It also occurs in the Uinta Mountains, and sporadically in eastern Idaho and western Wyoming.

VEGETATION.- Mertensia ciliata dominates the community. Common associates include Heracleum lanatum, Rudbeckia occidentalis, Geranium richardsonii, and Senecio triangularis. Graminoids are variable and usually contribute little cover.

SOILS.- Limited soils data suggest a high available water capacity with a fine loamy particle-size class.

SUCCESSION/MANAGEMENT.- The MECI c.t. represents relatively stable vegetation. Disturbance by livestock may result in a gradual increase in Rudbeckia occidentalis or Helenium hoopesii. Domestic sheep may find succulent forbs within this c.t.

OTHER STUDIES.- The MECI c.t. has been described by Gregory (1983) and Youngblood and others (1985).

VERATRUM CALIFORNICUM c.t.

(VECA)

DISTRIBUTION.- VEGA is a minor type sampled only in southern Idaho. It was noted, however, within the southwestern Uinta Mountains and on the Wasatch Plateau south of our study area. It also extends into western Wyoming. It usually occurs in broad meadows, especially at higher elevations with late snowmelt. Adjacent riparian communities often belong to the CAREX NEBRASCENSIS or DESCHAMPSIA CESPITOSA c.t.

VEGETATION.- *Veratrum californicum* dominates the community, and may limit the establishment of other species. A few stands may contain *Ranunculus alismaefolius* or *Mertensia ciliata* in openings.

SOILS.- Limited data indicate these soils are formed in residual or colluvial material. Water tables are near the surface during the early growing season but may become dry by mid-summer. Available water capacity is typically high.

SUCCESSION/MANAGEMENT.- VECA communities appear stable or slowly enlarging. Few other species show potential to invade this type. Production of *Veratrum* may be very high, but of little value to livestock. Sheep may consume the young shoots and leaves after frost, but generally avoid the plant during the grazing season (Dayton 1960). Naturally occurring alkaloids are poisonous to lovestock throughout the grazing season, and may cause lambs to be born with congenital deformities of the head (James and others 1980).

OTHER STUDIES.- Youngblood and others (1985) described the VECA c.t. in eastern Idaho and western Wyoming. Kerr and Henderson (1979) described similar communities from the Wasatch Plateau in central Utah.

Wetland Communities

Scattered throughout northern Utah and southern Idaho are plant communities associated with persistent standing water. These communities contain species that are especially adapted to withstanding anaerobic substrate conditions. Most communities are dominated by a single species with few associations. They sometimes occur as transitional communities between open water of lacustrine systems and riparian c.t.'s. More frequently, they are found as islands or margins of riverine systems, and are important for controlling sediment deposition. Most occur below 1 830 m (6,000 feet) in elevation. Although several of our typical riparian

c.t.'s would also be considered wetland according to the U.S. Fish and Wildlife Service (Cowardin and others 1979), our description is of communities on sites which are saturated throughout the growing season. They are presented here as a group because of similarity in management.

Dense stands of Phalaris arundinacaea occur along the Logan River and Blacksmiths Fork. Soils typically have organic or silty surfaces, with sandy subsurface horizons and are classified as Haplaquolls. Once established, Phalaris apparently resists minor stream channel migration movements, and creates an efficient filter of upstream sedimentation. Typha latifolia stands are also along the major rivers. These sites appear to have slightly thicker accumulations of organic matter, silts, and loams. Standing water may also be deeper. A single stand of Scirpus microcarpus was sampled on a wet terrace adjacent to the Blacksmith Fork. Soils are classified as Cumulic Haplaquoll, clayey over loamy-skeletal. A Scirpus acutis community was sampled in the northern portion of the Caribou Range along Fall Creek. The soils are classified as Terric Borohemist, fine-loamy, and are derived from weathering of travertine deposits. Finally, an Eleocharis palustris community, found at 2 530 m (8,300 feet) in elevation in Gibson Basin, Idaho, at the edge of a small pond within a large meadow, has between 1 and 3 cm (4 and 12 inches) of standing water. Soils are classified as Aeric-Humic Cryaquepts, fine clayey. Our CAREX ROSTRATA and DESCHAMPSIA CESPITOSA c.t.'s are adjacent on drier sites.

Unclassified Stands

A small percentage of our sample stands are not classified into community types. A few may represent distant outliers of types known from Wyoming and Idaho, such as communities of Salix boothii with Poa palustris. A few others include apparently unique species compositions, such as a

Salix amygdaloides and *Smilacina stellata* stand in Logan Canyon, or a *Poa reflexa* stand in Egan Basin, Idaho, that resembles our DESCHAMPSIA CESPITOSA c.t. A stand of *Carex lanuginosa* along the Blacksmith Fork River is similar to stands of *Carex nebrascensis*; the soils are classified as Fluvaguentic Haplaquolls, with coarse loamy particle-size class, and are wet to the surface. Finally, a few stands of non-riparian vegetation were sampled, including *Acer negundo* with *Smilacina stellata* or *Rhus trilobata*. These situations helped refine our concepts of riparian zones, especially the soil characteristics.

USE OF THE CLASSIFICATION

This classification attempts to provide a natural stratification of riparian ecosystems of northern Utah and southern Idaho. The classification is based on existing vegetation regardless of successional status or disturbance level. The goal of this classification effort was to develop community types that are meaningful and useful to the resource manager who may be concerned with management practices and their consequences within the riparian ecosystem. We consider this classification preliminary, because it is based on limited work and relatively few samples. The classification is presented in its present format to permit field testing and refinement. Users may forward recommendations to the Regional Ecology and Classification Program, Range and Watershed Management, Intermountain Region, Forest Service, U.S. Department of Agriculture, Ogden, UT.

Perhaps the most significant aspect of this classification is its delineation of riparian ecosystems for the mountainous portions of northern Utah and southern Idaho. Resource managers now have a tool for identifying, in a field situation, the existence of the riparian zone and

the ecotone between it and terrestrial communities. This classification allows the resource manager to more accurately determine the distribution and relative amounts of riparian communities for the area of concern. In addition, the resource manager has a tool for describing riparian resources and communicating concepts relating to riparian community types for a variety of users through a single common classification.

At a broader scale, our classification portrays the diversity of communities, successional patterns, and site characteristics within riparian ecosystems of northern Utah and southern Idaho. It provides an inventory of the major plant species, insights into the relative amplitudes of common riparian species, a basis for continued study of successional relationships, and framework for presentation of wildlife and range values and changes following disturbances. Finally, as a stratification tool, the classification may aid in additional research into the relationships between streambank stability and fisheries, forage production and wildlife habitat, and structural characteristics and natural fire intervals.

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APPENDIX A. NUMBER OF SAMPLE STANDS BY RIPARIAN COMMUNITY TYPE AND VICINITY IN NORTHERN UTAH AND ADJACENT IDAHO.

CE = Caribou National Forest-East; Caribou Range
CW = Caribou National Forest-West; Portneuf, Bannock, and Malad Ranges
BR = Caribou and Wasatch-Cache National Forest; Bear River Range
WN = Wasatch-Cache National Forest; Wasatch Range
WS = Uinta National Forest; Wasatch Range and Western Uinta Mountains

	Vicinity					
	CE	CW	BR	WN	WS	TOTAL
Tree-Dominated Community Types						
PICEA/COST	1	.	1	.	.	2
PICEA/GATR	.	.	1	1	1	3
BEOC/COST	2	3	11	5	2	23
POAN/COST	.	.	5	1	.	6
POAN/POPR	.	.	9	.	5	14
ACNE/COST	.	.	4	1	1	6
ACNE/EQAR	.	.	.	2	1	3
						57
Mixed Shrub-Dominated Community Types						
ALIN/RIHU	3	.	6	3	2	14
COST	3	1	6	1	1	12
POFR/DECE	2	1	1	.	.	4
POFR/POPR	.	.	1	.	.	1
ARCA/POPR	1	.	.	.	2	3
						34
***Salix geyeriana*-Dominated Community Types**						
SAGE/CARO	1	1	.	.	.	2
SAGE/MF	.	1	.	.	.	1
SAGE/POPR	5	.	2	.	.	7
						10
***Salix boothii*-Dominated Community Types**						
SABO/CARO	5	.	5	.	2	12
SABO/CANE	1	.	.	.	.	1
SABO/CACA	2	.	1	1	.	4
SABO/EQAR	.	.	1	.	.	1
SABO/SMST	4	.	7	2	8	21
SABO/POPR	4	.	1	1	2	8
						47

Salix wolfii-Dominated Community Types						
SAWO/CAAQ	2		1			3
SAWO/DECE	.	.	1	.	.	1
SAWO/MF	.	.	2	.	.	2
						6
Additional *Salix*-Dominated Community Types						
SAEX/EQAR	1		1	1	.	3
SAEX/POPR	4	1	3	.	1	9
SALU	1	1	2	1	3	8
						20
Graminoid-Dominated Community Types						
CARO	4	.	4	.	2	10
CAAQ	1	.	2	.	2	5
CAMI	2	.	2	.	.	4
CANE	2	.	5	.	2	9
JUBA	2	.	2	.	.	4
DECE	1	.	2	.	.	3
POPR	1	.	2	.	.	3
						38
Forb-Dominated Community Types						
VECA	1	.	2	.	.	3
MECI	.	.	1	.	.	1
						4
Wetland Communities	1	1	6	.	.	8
Unclassified Stands	.	.	3	1	4	8
TOTAL	57[1]	10	103	21	41	232

[1]Includes 43 sample stands previously classified by Youngblood and others (1985).

APPENDIX B. CONSTANCY AND AVERAGE COVER OF IMPORTANT PLANTS IN NORTHERN UTAH AND ADJACENT IDAHO RIPARIAN COMMUNITY TYPES.

	BEOC/ COST	POAN/ COST	POAN/ POPR	ACNE/ COST	ALIN/ RIHU	COST	POFR/ DECE	SAGE/ POPR
NST/GRP:	23	6	14	6	14	12	4	7
TREES								
ABIES LASIOCARPA	13(3)	17(15)	7(18)	17(7)	29(5)	-(-)	-(-)	14(2)
PICEA ENGELMANNII	-(-)	-(-)	-(-)	-(-)	7(3)	-(-)	-(-)	-(-)
POPULUS TREMULOIDES	-(-)	17(T)	7(T)	-(-)	7(45)	17(30)	-(-)	-(-)
PSEUDOTSUGA MENZIESII	4(5)	17(25)	-(-)	-(-)	-(-)	8(15)	-(-)	-(-)
ACER NEGUNDO	26(31)	33(40)	50(43)	100(63)	7(5)	8(4)	-(-)	-(-)
BETULA OCCIDENTALIS	100(64)	17(20)	29(19)	17(15)	7(5)	8(7)	-(-)	-(-)
JUNIPERUS SCOPULORUM	13(1)	-(-)	21(1)	-(-)	-(-)	8(6)	-(-)	-(-)
POPULUS ANGUSTIFOLIA	26(44)	100(68)	100(69)	-(-)	7(15)	-(-)	-(-)	-(-)
SHRUBS								
ACER GLABRUM	13(4)	-(-)	14(7)	-(-)	7(3)	8(50)	-(-)	-(-)
ALNUS INCANA	22(12)	50(19)	7(10)	17(40)	86(55)	17(5)	-(-)	-(-)
AMELANCHIER ALNIFOLIA	22(10)	50(13)	29(2)	17(20)	-(-)	-(-)	-(-)	14(T)
ARTEMISIA CANA	-(-)	-(-)	7(1)	-(-)	-(-)	-(-)	50(4)	29(2)
BETULA GLANDULOSA	-(-)	-(-)	-(-)	-(-)	7(2)	-(-)	25(45)	-(-)
CORNUS STOLONIFERA	87(56)	100(83)	14(13)	100(58)	57(67)	100(75)	-(-)	14(5)
CRATAEGUS DOUGLASII	4(15)	17(2)	7(40)	-(-)	7(1)	8(10)	-(-)	-(-)
LONICERA INVOLUCRATA	13(19)	-(-)	-(-)	-(-)	50(19)	17(2)	-(-)	57(6)
POTENTILLA FRUTICOSA	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	100(50)	14(8)
RIBES HUDSONIANUM	4(10)	-(-)	-(-)	-(-)	36(47)	8(15)	-(-)	-(-)
RIBES INERME	9(21)	17(60)	-(-)	17(6)	29(5)	17(5)	-(-)	29(15)
RIBES LACUSTRE	9(17)	17(T)	-(-)	17(1)	29(3)	33(7)	-(-)	29(10)
ROSA WOODSII	57(8)	67(5)	71(3)	67(6)	50(3)	67(9)	-(-)	29(2)
SALIX BOOTHII	9(10)	-(-)	-(-)	-(-)	29(12)	33(23)	-(-)	29(14)
SALIX DRUMMONDIANA	-(-)	-(-)	-(-)	-(-)	14(23)	17(21)	-(-)	-(-)
SALIX EXIGUA	13(25)	17(20)	14(2)	17(10)	21(6)	58(30)	-(-)	-(-)
SALIX GEYERIANA	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	100(54)
SALIX LASIANDRA	4(T)	17(25)	-(-)	-(-)	-(-)	8(12)	-(-)	14(3)
SALIX LUTEA	26(22)	17(35)	21(6)	33(40)	21(7)	25(43)	-(-)	-(-)
SYMPHORICARPOS OREOPHILUS	17(3)	-(-)	36(4)	17(T)	-(-)	-(-)	-(-)	-(-)
GRAMINOIDS								
AGROPYRON TRACHYCAULUM	-(-)	-(-)	-(-)	-(-)	-(-)	8(1)	50(2)	14(5)
AGROSTIS EXARATA	-(-)	-(-)	-(-)	-(-)	7(10)	-(-)	-(-)	-(-)
AGROSTIS STOLONIFERA	17(16)	50(2)	29(29)	-(-)	29(24)	8(T)	25(2)	43(3)
CALAMAGROSTIS CANADENSIS	4(5)	-(-)	-(-)	-(-)	21(6)	8(1)	-(-)	14(7)
CAREX AQUATILIS	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	25(T)	-(-)
CAREX HOODII	-(-)	17(T)	14(T)	-(-)	-(-)	8(T)	-(-)	14(20)
CAREX LANUGINOSA	13(10)	-(-)	-(-)	-(-)	7(T)	-(-)	50(23)	71(12)
CAREX MICROPTERA	-(-)	-(-)	-(-)	-(-)	14(16)	-(-)	100(11)	43(14)
CAREX NEBRASCENSIS	4(T)	-(-)	-(-)	-(-)	-(-)	-(-)	50(4)	29(3)
CAREX PRAEGRACILIS	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	75(25)	14(2)
CAREX ROSTRATA	-(-)	-(-)	-(-)	-(-)	-(-)	8(T)	-(-)	29(8)
DACTYLIS GLOMERATA	26(15)	-(-)	50(16)	50(17)	7(15)	8(T)	-(-)	-(-)
DESCHAMPSIA CESPITOSA	-(-)	-(-)	7(1)	-(-)	7(10)	-(-)	100(29)	57(30)
ELYMUS GLAUCUS	26(4)	83(2)	29(36)	33(11)	50(8)	42(2)	-(-)	43(2)
GLYCERIA	9(9)	-(-)	-(-)	-(-)	14(1)	-(-)	-(-)	-(-)
GLYCERIA GRANDIS	-(-)	-(-)	-(-)	-(-)	14(4)	8(1)	-(-)	-(-)
GLYCERIA STRIATA	9(4)	17(T)	-(-)	-(-)	14(3)	8(2)	-(-)	43(2)

	BEOC/ COST	POAN/ COST	POAN/ POPR	ACNE/ COST	ALIN/ RIHU	COST	POFR/ DECE	SAGE/ POPR
NST/GRP:	23	6	14	6	14	12	4	7
HORDEUM BRACHYANTHERUM	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	25(3)	43(4)
JUNCUS	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	50(13)	-(-)
JUNCUS BALTICUS	9(19)	-(-)	7(25)	-(-)	-(-)	-(-)	25(50)	86(14)
JUNCUS ENSIFOLIUS	4(2)	-(-)	14(1)	-(-)	7(5)	-(-)	-(-)	14(5)
MUHLENBERGIA	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	50(12)	-(-)
PHALARIS ARUNDINACEA	4(8)	-(-)	-(-)	-(-)	7(T)	-(-)	-(-)	-(-)
POA PALUSTRIS	13(18)	-(-)	7(20)	17(T)	14(4)	8(3)	-(-)	-(-)
POA PRATENSIS	48(14)	67(13)	93(50)	50(7)	43(17)	75(6)	50(20)	100(34)
POA TRIVIALIS	4(50)	-(-)	-(-)	-(-)	7(5)	8(30)	-(-)	-(-)
TRISETUM WOLFII	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	75(1)	14(2)
FORBS								
ACONITUM COLUMBIANUM	9(19)	-(-)	-(-)	-(-)	29(12)	8(2)	-(-)	-(-)
ACTAEA RUBRA	22(3)	33(2)	7(5)	50(5)	43(4)	25(1)	-(-)	-(-)
ARCTIUM MINUS	26(5)	17(4)	29(6)	67(9)	-(-)	8(10)	-(-)	-(-)
ASTER	26(5)	-(-)	21(5)	-(-)	21(9)	42(1)	100(6)	43(1)
ASTER CHILENSIS	4(25)	-(-)	14(2)	-(-)	-(-)	-(-)	-(-)	-(-)
ASTER EATONII	4(15)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
ASTER FOLIACEUS	-(-)	-(-)	7(1)	-(-)	-(-)	-(-)	-(-)	-(-)
CARDAMINE CORDIFOLIA	-(-)	-(-)	-(-)	-(-)	7(5)	-(-)	25(1)	-(-)
CIRSIUM	17(2)	17(1)	14(1)	17(3)	21(1)	25(3)	25(T)	57(1)
CIRSIUM ARVENSE	-(-)	-(-)	-(-)	-(-)	21(4)	8(1)	-(-)	-(-)
CYNOGLOSSUM OFFICINALE	-(-)	-(-)	14(14)	-(-)	-(-)	-(-)	-(-)	-(-)
EPILOBIUM	22(1)	17(T)	-(-)	-(-)	14(1)	17(T)	50(1)	29(T)
FRAGARIA VESCA	9(5)	-(-)	7(1)	17(T)	-(-)	8(2)	-(-)	-(-)
FRAGARIA VIRGINIANA	9(T)	-(-)	-(-)	-(-)	-(-)	-(-)	100(25)	57(13)
GALIUM BOREALE	4(2)	-(-)	-(-)	-(-)	-(-)	8(T)	25(T)	29(23)
GALIUM TRIFLORUM	22(4)	-(-)	7(T)	-(-)	29(1)	42(4)	-(-)	-(-)
GERANIUM RICHARDSONII	22(11)	17(T)	7(20)	-(-)	64(6)	25(1)	-(-)	14(10)
GEUM MACROPHYLLUM	22(1)	17(T)	14(2)	-(-)	50(2)	50(1)	75(1)	100(2)
HERACLEUM LANATUM	35(16)	-(-)	7(2)	33(5)	64(8)	58(5)	-(-)	-(-)
MEDICAGO	4(20)	-(-)	29(4)	-(-)	-(-)	-(-)	-(-)	-(-)
MENTHA ARVENSIS	13(3)	-(-)	14(T)	-(-)	36(1)	-(-)	-(-)	14(T)
MERTENSIA CILIATA	4(2)	-(-)	-(-)	-(-)	21(3)	17(4)	25(3)	-(-)
MIMULUS GUTTATUS	-(-)	-(-)	-(-)	-(-)	14(T)	-(-)	25(20)	-(-)
OSMORHIZA CHILENSIS	22(10)	17(5)	36(9)	67(2)	7(T)	17(7)	-(-)	-(-)
POLEMONIUM OCCIDENTALE	4(20)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	14(T)
POTENTILLA GRACILIS	-(-)	-(-)	7(T)	-(-)	7(1)	-(-)	75(32)	71(17)
RUDBECKIA OCCIDENTALIS	4(1)	17(T)	14(2)	-(-)	21(5)	17(3)	-(-)	14(1)
SENECIO SERRA	13(3)	-(-)	14(1)	33(1)	14(2)	33(6)	-(-)	29(T)
SENECIO TRIANGULARIS	-(-)	-(-)	-(-)	-(-)	36(1)	-(-)	-(-)	-(-)
SIDALCEA OREGANA	-(-)	-(-)	7(10)	-(-)	7(T)	-(-)	-(-)	-(-)
SMILACINA STELLATA	65(8)	50(4)	29(3)	67(9)	36(26)	50(3)	50(1)	43(3)
SOLIDAGO CANADENSIS	13(6)	-(-)	7(T)	-(-)	14(8)	8(1)	-(-)	-(-)
THALICTRUM FENDLERI	13(T)	-(-)	-(-)	-(-)	14(3)	17(2)	25(T)	14(1)
URTICA DIOICA	22(11)	-(-)	14(1)	17(T)	50(5)	67(5)	-(-)	-(-)
MOSS	13(19)	-(-)	7(40)	-(-)	29(4)	17(3)	25(40)	14(45)
EQUISETUM ARVENSE	30(2)	67(2)	14(8)	-(-)	64(9)	25(32)	25(T)	14(T)
EQUISETUM HYEMALE	17(19)	17(85)	-(-)	17(5)	7(15)	8(T)	-(-)	-(-)

	SABO/ CARO	SABO/ SMST	SABO/ POPR	SALU	SAEX/ POPR	CARO	CAAQ	CANE
NST/GRP:	12	21	8	8	9	10	5	9
TREES								
ABIES LASIOCARPA	8(T)	10(3)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
PICEA ENGELMANNII	8(9)	5(T)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
POPULUS TREMULOIDES	-(-)	5(25)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
PSEUDOTSUGA MENZIESII	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
ACER NEGUNDO	-(-)	-(-)	-(-)	-(-)	11(4)	-(-)	-(-)	-(-)
BETULA OCCIDENTALIS	-(-)	-(-)	-(-)	13(20)	11(5)	-(-)	-(-)	-(-)
JUNIPERUS SCOPULORUM	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
POPULUS ANGUSTIFOLIA	-(-)	5(2)	-(-)	13(15)	11(7)	-(-)	-(-)	-(-)
SHRUBS								
ACER GLABRUM	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
ALNUS INCANA	-(-)	-(-)	-(-)	25(20)	-(-)	-(-)	-(-)	-(-)
AMELANCHIER ALNIFOLIA	-(-)	-(-)	13(5)	-(-)	11(1)	-(-)	-(-)	-(-)
ARTEMISIA CANA	-(-)	-(-)	25(2)	-(-)	-(-)	-(-)	-(-)	-(-)
BETULA GLANDULOSA	17(33)	5(15)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
CORNUS STOLONIFERA	-(-)	5(3)	13(5)	38(6)	33(3)	-(-)	-(-)	-(-)
CRATAEGUS DOUGLASII	-(-)	-(-)	13(T)	-(-)	11(T)	-(-)	-(-)	-(-)
LONICERA INVOLUCRATA	50(13)	62(20)	38(5)	13(7)	22(1)	-(-)	-(-)	-(-)
POTENTILLA FRUTICOSA	-(-)	-(-)	-(-)	-(-)	-(-)	10(1)	-(-)	-(-)
RIBES HUDSONIANUM	-(-)	-(-)	13(2)	13(T)	-(-)	-(-)	-(-)	-(-)
RIBES INERME	25(15)	24(21)	25(7)	25(4)	22(7)	-(-)	-(-)	-(-)
RIBES LACUSTRE	25(1)	24(11)	38(9)	-(-)	22(7)	-(-)	-(-)	-(-)
ROSA WOODSII	8(2)	14(5)	25(3)	25(8)	67(20)	-(-)	-(-)	-(-)
SALIX BOOTHII	100(70)	90(66)	100(44)	38(12)	22(5)	20(7)	40(T)	-(-)
SALIX DRUMMONDIANA	33(44)	67(40)	63(29)	13(15)	-(-)	10(2)	20(T)	-(-)
SALIX EXIGUA	-(-)	-(-)	13(25)	38(7)	100(74)	-(-)	-(-)	-(-)
SALIX GEYERIANA	8(25)	-(-)	-(-)	-(-)	-(-)	10(T)	-(-)	-(-)
SALIX LASIANDRA	-(-)	14(14)	13(8)	63(59)	-(-)	-(-)	-(-)	-(-)
SALIX LUTEA	-(-)	-(-)	-(-)	63(51)	22(3)	-(-)	-(-)	-(-)
SYMPHORICARPOS OREOPHILUS	-(-)	10(3)	-(-)	-(-)	11(1)	-(-)	-(-)	-(-)
GRAMINOIDS								
AGROPYRON TRACHYCAULUM	-(-)	10(3)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
AGROSTIS EXARATA	-(-)	10(2)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
AGROSTIS STOLONIFERA	8(T)	14(25)	25(2)	38(17)	33(28)	20(25)	-(-)	22(6)
CALAMAGROSTIS CANADENSIS	17(17)	14(3)	-(-)	-(-)	22(3)	10(5)	-(-)	-(-)
CAREX AQUATILIS	67(37)	10(9)	-(-)	-(-)	-(-)	40(13)	100(88)	-(-)
CAREX HOODII	-(-)	10(1)	25(3)	-(-)	-(-)	-(-)	-(-)	-(-)
CAREX LANUGINOSA	8(5)	5(1)	-(-)	-(-)	33(6)	-(-)	-(-)	11(20)
CAREX MICROPTERA	8(10)	29(10)	38(3)	13(2)	-(-)	10(5)	40(26)	22(T)
CAREX NEBRASCENSIS	-(-)	-(-)	-(-)	13(8)	-(-)	20(8)	-(-)	100(86)
CAREX PRAEGRACILIS	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
CAREX ROSTRATA	75(30)	10(8)	-(-)	25(T)	11(T)	100(85)	20(20)	22(8)
DACTYLIS GLOMERATA	-(-)	-(-)	-(-)	13(T)	11(T)	-(-)	-(-)	-(-)
DESCHAMPSIA CESPITOSA	17(3)	5(3)	-(-)	-(-)	-(-)	20(3)	60(4)	44(24)
ELYMUS GLAUCUS	-(-)	29(11)	50(4)	13(5)	22(29)	-(-)	-(-)	-(-)
GLYCERIA	17(23)	-(-)	-(-)	13(3)	-(-)	10(1)	-(-)	22(9)
GLYCERIA GRANDIS	-(-)	-(-)	-(-)	-(-)	11(1)	-(-)	-(-)	-(-)
GLYCERIA STRIATA	8(T)	-(-)	-(-)	13(10)	11(1)	30(8)	-(-)	33(13)

NST/GRP:	SABO/ CARO 12	SABO/ SMST 21	SABO/ POPR 8	SALU 8	SAEX/ POPR 9	CARO 10	CAAQ 5	CANE 9
HORDEUM BRACHYANTHERUM	17(1)	14(1)	25(2)	-(-)	-(-)	20(15)	40(10)	33(6)
JUNCUS	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
JUNCUS BALTICUS	17(25)	-(-)	-(-)	13(T)	-(-)	-(-)	20(T)	33(9)
JUNCUS ENSIFOLIUS	25(1)	5(5)	-(-)	-(-)	-(-)	20(11)	-(-)	11(T)
MUHLENBERGIA	-(-)	5(30)	-(-)	-(-)	-(-)	20(3)	20(40)	11(15)
PHALARIS ARUNDINACEA	-(-)	-(-)	-(-)	13(20)	11(2)	-(-)	-(-)	-(-)
POA PALUSTRIS	17(3)	19(21)	13(2)	13(1)	-(-)	-(-)	-(-)	-(-)
POA PRATENSIS	33(14)	48(23)	88(38)	38(28)	67(43)	30(15)	-(-)	33(15)
POA TRIVIALIS	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	22(4)
TRISETUM WOLFII	8(1)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
FORBS								
ACONITUM COLUMBIANUM	-(-)	14(3)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)
ACTAEA RUBRA	-(-)	10(1)	13(T)	13(T)	-(-)	-(-)	-(-)	-(-)
ARCTIUM MINUS	-(-)	-(-)	-(-)	-(-)	22(4)	-(-)	-(-)	-(-)
ASTER	33(2)	10(1)	25(1)	-(-)	22(3)	20(9)	-(-)	-(-)
ASTER CHILENSIS	-(-)	-(-)	-(-)	-(-)	11(2)	-(-)	-(-)	-(-)
ASTER EATONII	8(3)	-(-)	-(-)	13(7)	-(-)	-(-)	-(-)	-(-)
ASTER FOLIACEUS	8(1)	14(1)	-(-)	-(-)	-(-)	-(-)	20(5)	-(-)
CARDAMINE CORDIFOLIA	8(10)	5(T)	-(-)	13(1)	-(-)	-(-)	-(-)	-(-)
CIRSIUM	33(3)	43(10)	50(23)	50(7)	44(5)	10(1)	-(-)	-(-)
CIRSIUM ARVENSE	-(-)	5(10)	13(75)	-(-)	11(10)	-(-)	-(-)	-(-)
CYNOGLOSSUM OFFICINALE	-(-)	5(T)	-(-)	38(1)	11(1)	-(-)	-(-)	-(-)
EPILOBIUM	33(T)	5(T)	-(-)	38(1)	33(1)	30(2)	60(1)	56(2)
FRAGARIA VESCA	-(-)	-(-)	13(T)	-(-)	11(T)	-(-)	-(-)	-(-)
FRAGARIA VIRGINIANA	25(1)	33(7)	50(17)	-(-)	11(T)	-(-)	-(-)	-(-)
GALIUM BOREALE	17(5)	-(-)	25(20)	-(-)	22(5)	-(-)	-(-)	-(-)
GALIUM TRIFLORUM	-(-)	5(5)	13(T)	13(3)	11(8)	-(-)	-(-)	-(-)
GERANIUM RICHARDSONII	8(15)	43(5)	13(T)	38(5)	11(10)	-(-)	-(-)	-(-)
GEUM MACROPHYLLUM	17(T)	52(1)	50(3)	38(4)	33(1)	30(2)	-(-)	11(T)
HERACLEUM LANATUM	8(5)	57(21)	50(3)	13(40)	22(50)	-(-)	-(-)	-(-)
MEDICAGO	-(-)	-(-)	-(-)	13(40)	-(-)	-(-)	-(-)	-(-)
MENTHA ARVENSIS	33(9)	19(6)	13(T)	13(8)	22(5)	20(3)	-(-)	33(5)
MERTENSIA CILIATA	-(-)	48(10)	13(2)	13(3)	22(3)	-(-)	-(-)	-(-)
MIMULUS GUTTATUS	17(1)	10(2)	13(1)	25(3)	-(-)	30(21)	20(1)	44(4)
OSMORHIZA CHILENSIS	-(-)	5(T)	-(-)	13(3)	11(T)	-(-)	-(-)	-(-)
POLEMONIUM OCCIDENTALE	17(1)	14(1)	-(-)	13(T)	-(-)	10(2)	20(T)	-(-)
POTENTILLA GRACILIS	-(-)	29(1)	13(T)	-(-)	11(1)	10(T)	-(-)	22(T)
RUDBECKIA OCCIDENTALIS	-(-)	14(5)	38(7)	25(3)	11(T)	-(-)	-(-)	-(-)
SENECIO SERRA	-(-)	43(6)	25(1)	25(1)	11(40)	-(-)	-(-)	-(-)
SENECIO TRIANGULARIS	8(T)	5(T)	13(T)	-(-)	-(-)	-(-)	-(-)	-(-)
SIDALCEA OREGANA	8(8)	-(-)	-(-)	-(-)	-(-)	10(T)	-(-)	-(-)
SMILACINA STELLATA	25(1)	67(33)	50(4)	13(10)	-(-)	10(T)	-(-)	-(-)
SOLIDAGO CANADENSIS	17(2)	-(-)	25(4)	-(-)	11(45)	-(-)	-(-)	-(-)
THALICTRUM FENDLERI	-(-)	33(13)	13(8)	13(1)	-(-)	-(-)	-(-)	-(-)
URTICA DIOICA	17(T)	48(23)	63(11)	63(6)	33(17)	-(-)	-(-)	-(-)
MOSS	25(26)	14(6)	-(-)	13(5)	-(-)	30(45)	60(46)	22(T)
EQUISETUM ARVENSE	33(2)	24(1)	25(T)	88(25)	22(T)	20(6)	40(1)	22(T)
EQUISETUM HYEMALE	-(-)	-(-)	13(T)	-(-)	11(T)	-(-)	-(-)	-(-)

ENDIX C. SUBSTRATE FEATURES OF NORTHERN UTAH AND ADJACENT IDAHO RIPARIAN MUNITY TYPES.

L TAXONOMY (% Occurrence)

	BEOC/COST	POAN/COST	POAN/POPR	ACNE/COST	ALIN/RIHU	COST
n=	23	6	14	6	14	12
lisols						
Cryaquolls						
Cumulic	.	.	.	.	7	8
Histic	4	.	.	.	.	.
Typic	4	.	.	.	29	25
Haplaquolls						
Cumulic	4	50	14	67	.	17
Fluvaquentic	4	.	.	.	7	.
Typic	13	.	.	.	7	8
Cryoborolls						
Aquic	13	.	7	.	.	8
Cumulic	4	.	7	.	7	.
Haploborolls						
Aquic	9	.	.	.	.	8
Fluvaquentic	4	.	.	.	.	.
Typic	13	17	36	.	.	8
:isols						
Cryaquents						
Typic	4	.	.	.	21	.
Cryofluvents						
Aquic	4	.	.	.	.	.
Mollic	4	.	.	.	.	.
Typic	.	.	7	.	7	.
Fluvaquents						
Aeric	.	.	7	.	.	.
Udifluvents						
Aquic	4	.	7	.	.	8
Typic	4	.	.	.	.	.
;eptisols						
Cryaquepts						
Aeric	.	.	.	.	.	.
Humic	.	.	.	.	7	8
Typic	.	.	.	.	.	.
Haplaquepts	4	.	.	.	.	.
Haplumbrepts	.	33	.	.	.	.
;tosols						
Borofibrists	.	.	.	.	.	.
All others	.	.	.	.	.	.
:lassified	.	.	14	32	7	.

FAMILY PARTICLE-SIZE CLASS

	BEOC/COST	POAN/COST	POAN/POPR	ACNE/COST	ALIN/RIHU	COST
Sandy-skeletal	22	.	14	17	29	8
Loamy-skeletal	13	.	7	.	14	25
Loamy over-skeletal	44	50	36	50	29	33
Clayey over-skeletal	5	.	7	.	.	.
Sandy	.	17	7	.	7	8
Coarse-loamy	.	.	.	17	7	17
Fine-loamy	13	16	14	.	14	.
Clayey	.	16	.	.	.	.
Other	.	.	14	16	.	8

WATER TABLE (cm, mean and 90% C.I.)[1]

	21-100+	68-100+	61-100+	75-100+	32-100+	40-100+
No. observations	23	6	12	4	13	9

AVAILABLE WATER CAPATICY (mean and 90% C.I.)[2]

	$.14\pm.02$	$.12\pm.03$	$.11\pm.03$	$.15\pm.05$	$.10\pm.02$	$.11\pm.01$
No. observations	20	6	13	5	14	11

[1] 90% confidence interval given for c.t.'s with water tables within 100 cm of the surface.

[2] 90% confidence interval given for c.t.'s with at least 5 observations.

. TAXONOMY (% Occurrence)

	SABO/CARO	SABO/SMST	SABO/POPR	SAEX/POPR	SALU	CARO	CANE
n =	12	21	8	9	8	10	9
lisols							
:ryaquolls							
Cumulic	42	33	38	11	12	20	56
Histic	8	.	.	.	.	20	11
Typic	33	38	25	.	13	10	11
laplaquolls							
Cumulic	.	5	12	22	.	.	11
Fluvaquentic	.	.	.	.	12	.	.
Typic	.	.	.	11	.	.	.
:ryoborolls							
Aquic	.	.	.	.	13	.	.
Cumulic	.	.	12	.	.	.	.
laploborolls							
Aquic	.	.	.	.	.	.	.
Fluvaquentic	.	.	.	.	.	.	.
Typic	.	.	.	22	.	.	.
sols							
:ryaquents							
Typic	.	.	12	.	.	.	.
:ryofluvents							
Aquic	8	.	.	.	.	.	.
Mollic	.	.	.	.	.	.	.
Typic	.	.	.	11	12	.	.
'luvaquents							
Aeric	.	.	.	11	.	.	.
ldifluvents							
Aquic	.	.	.	.	13	.	.
Typic	.	.	.	.	.	.	.
ptisols							
:ryaquents							
Aeric	.	14	.	.	12	.	.
Humic	.	.	.	.	.	10	.
Typic	.	5	.	.	.	.	.
laplaquepts	.	5	.	11	.	.	.
laplumbrepts	.	.	.	.	.	.	.
osols							
orofibrists	.	.	.	.	.	10	11
ll others	8	.	.	.	.	10	.
assified	.	.	.	.	13	20	.

MILY PARTICLE-SIZE CLASS

	SABO/CARO	SABO/SMST	SABO/POPR	SAEX/POPR	SALU	CARO	CANE
Sandy-skeletal	8	5	12	11	12	.	.
Loamy-skeletal	.	9	13	.	13	.	.
Loam over-skeletal	8	52	25	33	25	.	11
Clayey over-skeletal	.	.	12	11		.	22
Sandy	.	.	.	.	12	.	.
Coarse-loamy	.	5	25	11	.	.	.
Fine-loamy	42	19	12	33	13	20	22
Clayey	33	5	.	.	12	50	44
Other	8	5	.	.	13	30	.

TER TABLE (cm, mean and 90% C.I.)[1]

	32±13	23-100+	32-100+	0-100+	57±29	11±12	23±17
No. observations	12	21	8	9	5	10	9

AILABLE WATER CAPACITY (mean and 90% C.I.)[2]

	.18±.01	.14±.01	.16±.02	.16_.02	.12±.03	.16±?	.18±.01
No. observations	10	20	7	9	8	4	8

90% confidence interval given for c.t.'s with water tables within 100 cm of the surface.

90% confidence interval given for c.t.'s with at least 5 observations.

APPENDIX D. GLOSSARY

The following terms are defined as used in this report. The definitions should minimize misunderstanding resulting from variations among different specialists. Primary references include Hanson (1962) and Daubenmire (1968).

Accidental. A species that is found rarely, or at most occasionally, as scattered individuals in a given community type; often as a random or chance occurrence.

Alluvium. Sediments deposited on land by streams and rivers.

Anaerobic. A condition characterized by the absence of free oxygen.

Aquatic ecosystem. The stream channel or lake bed, the water, and the biotic communities associated with them, forming an interacting system.

Available water capacity. The capacity of a soil to hold water in a form available to plants, expressed in inches of water per inch of soil depth. Commonly defined as the amount of water held between field capacity and wilting point. Classes include:

Low.	0 - .12
Moderate.	.13 - .17
High.	>.17

Canopy cover. The area covered by the generalized outline of an individual plant's foliage, or collectively covered by all individuals of a species within a stand or sample area. Canopy coverage is expressed as a percentage of the total area in the plot.

Classification. The orderly arrangement of objects according to their differences and similarities in attributes.

Community (plant community). An assemblage of plants occurring together at any point in time, thus denoting no particular ecological status. A unit of vegetation.

Community type. An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. A unit of vegetation within a classification.

Constancy. The percentage occurrence of a species within a given community type.

Depauperate. A condition characterized by an unusually sparse coverage of vegetation.

Ecotone. A transition zone or boundary between adjacent plant communities.

Fluvial. Pertaining to or produced by the action of a stream or river.

Forb. A herbaceous plant, usually broadleafed, that is not a graminoid.

Gleyed soils. Soils having an intense reduction of iron during soil development, or reducing conditions due to stagnant water, as indicated by base colors that approach neutral (blueish, grayish, or greenish), with or without mottles. In the more extreme condition, iron is present in the ferrous form.

Graminoid. Grass or grass-like plant, such as Poa, Carex, and Juncus species.

Habitat type. An aggregation of all land areas potentially capable of producing a similar, stable plant community. A unit of land.

Herbaceous. Non-woody vegetation, such as graminoids and forbs.

Mottling. Variation of coloration in soils as represented by localized spots, patches, or blotches of contrasting color. Commonly develops under alternating wet and dry periods with associated reduction and oxidation environments. Mottling generally indicates poor aeration and impeded drainage.

Riparian ecosystem. That interacting system between aquatic and terrestrial situations identified by soil characteristics and distinctive vegetation that require or tolerate free or unbound water.

Riparian species. Plant species occurring within the riparian zone. Obligate species require the environmental conditions within the riparian zone;
Facultative species tolerate the environmental conditions, therefore may also occur away from the riparian zone.

Riparian zone. A geographically delineated portion of the riparian ecosystem.

Seral. Refers to species or communities which are eventually replaced by other species or communities within a successional sere.

Sere. All temporary communities in a successional sequence.

Stable. The condition of little or no perceived change in plant communities which are in relative equilibrium with existing environmental conditions; describes persistent but not necessarily culminating stages (climax) in plant succession.

Stand. An existing plant community that is relatively uniform in composition, structural, and site conditions; thus it may serve as a local example of a community type.

Stream Order. A classification of streams according to the number of bifurcations of the tributaries. Order 1 streams have no tributaries; a stream of any higher order has 2 or more tributaries of the next lower order.

Succession. The progressive changes in plant communities toward a steady state. Primary succession begins on a bare surface not previously occupied by plants, such as a recently deposited gravel bar.

Secondary succession occurs following disturbances on sites which previously supported vegetation.

Wetland communities. Plant communities that occur on sites with soils typically saturated with or covered with water for at least most of the growing season.

ENDIX E. NORTHERN UTAH-SOUTHERN IDAHO RIPARIAN COMMUNITY TYPE FIELD FORM.

Name			Date	Plot Number	
Topography	Horizontal Configuration		Location		
1 - Lower slope	1 - Convex				
2 - Bench or Flat	2 - Straight		T. R. S.		
3 - Stream Bottom	3 - Concave				
4 - Wide Meadow	4 - Undulating		Elevation	% Slope	
5 - Seep or Slump					
			Topography	Configuration	
Scientific Name	Code	Canopy Cover %	Scientific Name	Code	Canopy Cover
Trees			**Forbs**		
Abies lasiocarpa	ABLA		Actaea rubra	ACRU	
Acer negundo	ACNE		Equisetum arvense	EQAR	
Betula occidentalis	BEOC		Galium triflorum	GATR	
Picea engelmannii	PIEN		Heracleum lanatum	HELA	
Picea pungens	PIPU		Mertensia ciliata	MECI	
Pinus contorta	PICO		Pedicularis groenlandica	PEGR	
Populus acuminata	POAC		Senecio triangularis	SETR	
Populus angustifolia	POAN		Smilacina stellata	SMST	
			Thalictrum fendleri	THFE	
Shrubs			Veratrum californicum	VECA	
Alnus incana	ALIN		**Graminoids**		
Artemisia cana	ARCA				
Betula glandulosa	BEOC		Calamagrostis canadensis	CACA	
Cornus stolonifera	COST		Carex aquatilis	CAAQ	
Potentilla fruticosa	POFR		Carex microptera	CAMI	
Ribes hudsonianum	RIHU		Carex nebrascensis	CANE	
Salix boothii	SABO		Carex rostrata	CARO	
Salix drummondiana	SADR		Deschampsia cespitosa	DECE	
Salix exigua	SAEX		Juncus balticus	JUBA	
Salix geyeriana	SAGE		Poa pratensis	POPR	
Salix lasiandra	SALA				
Salix lutea	SALU				
Salix wolfii	SAWO		COMMUNITY TYPE		